VOL. V, No. 12

DECEMBER, 1950

AGRICULTURAL CHEMICALS

In This Issue:

1850

Congratulations

1950

TO THE FERTILIZER INDUSTRY ONE HUNDRED YEARS YOUNG

If pride in achievement is justifiable, the Fertilizer Industry may feel justly proud of its long record of assistance to American agriculture. During its first century of existence great progress has been made.

The coming century presents a many sided challenge:

1. Increasing Populations.
2. Increasing Standards of Living.
3. Increasing Economic Problems.
4. And above all, an Increasing and Urgent Demand for the Preservation of the Fertility and Productivity of our Greatest Heritage—The Good Earth.

We pledge our best efforts to the attainment of all constructive objectives.

P.C.A. SALT of the EARTH RED MURIATE

POTASH COMPANY OF AMERICA
Carlsbad, New Mexico

GENERAL SALES OFFICE . . . 50 Broadway, New York, N.Y.
MIDWESTERN SALES OFFICE . . . First National Bank Bldg., Peoria, Ill.
SOUTHERN SALES OFFICE . . . Candler Building, Atlanta, Ga.

CHART LINE SHOWS PRODUCTION OF P.C.A. 60% MURIATE USING 1939 AS 100%

What's Ahead in '51?

Will there be adequate rainfall for agriculture in 1951—or another dry season? How deeply will defense consumption cut into supplies of benzol and chlorine? We'd like to know the answers, too.

This we can promise:—

- We will maintain the high quality of POWCO BRAND concentrates.
- We will continue our policy of non-competition with our customers.
- We will continue to take care of their needs *first* to the best of our ability.

Whatever is ahead in '51, you have our sincere wishes for a successful year.

POWCO BRAND

John Powell & Co., Inc.

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AGRICULTURAL CHEMICALS

A Monthly Magazine For the Trade

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THIS MONTH'S COVER

Phosphate mining operation from the driver's seat . . . view of big shovel of "walking giant" which picks up 24-ton bucketfuls at rate of a ton every 1.5 seconds. Phosphate deposits lie beneath overburden of earth from 4 to 40 feet thick, and this dragline, owned by American Cyanamid Co. and operated at Sydney, Fla., is kept busy by fertilizer demand. (Photo by Louis Wilson, American Plant Food Council. See story, page 38.)

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DECEMBER 1950

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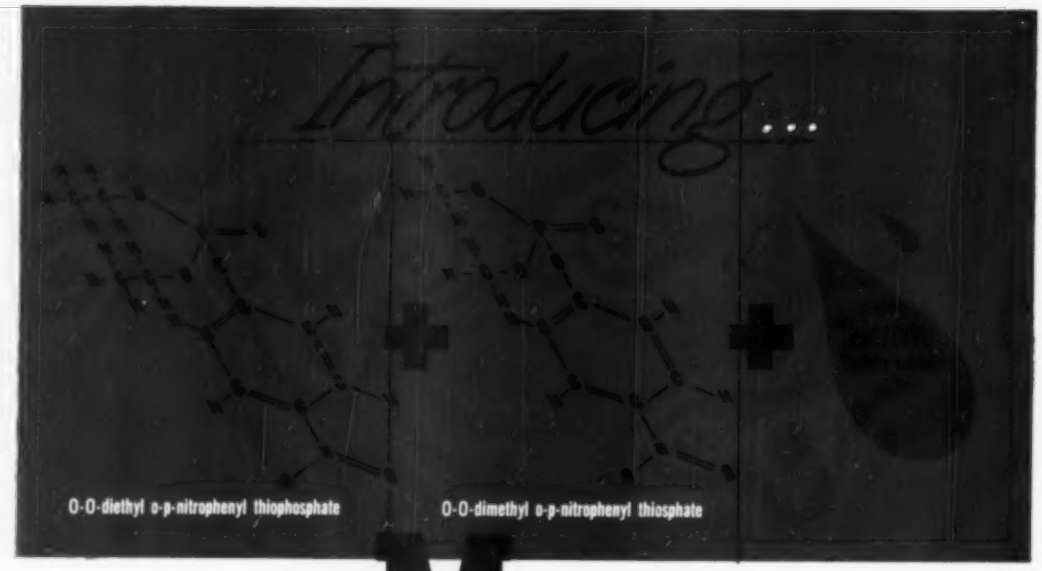
AGRICULTURAL CHEMICALS

Subscription Rates: *One year, United States, $3.00; Canada and Pan American countries, $4.00; Foreign, $5.00. Published monthly on the 15th by Industry Publications, Inc. Wayne E. Dorland, President; Ira P. MacNair, Secretary-Treasurer. Publication office, 123 Market Place, Baltimore 2, Md. Advertising and editorial office 254 W. 31st St., New York 1, New York — Chicago Office, 333 N. Michigan Blvd. Advertising rates made known on application. Closing date for copy — 20th of the month previous to date of issue.*

Entered as second-class matter November 4, 1949, at the Post Office at Baltimore, Md., under the Act of March 3, 1879.



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the new organic phosphate insecticide!

Highly effective against a wide range of insects. Five times less toxic to mammals.

Now you can use an organic phosphate insecticide with the effective strength of parathion *but with greatly reduced toxicity to mammals!* For METACIDE combines both the lessened toxic characteristics of the dimethyl homolog of parathion and the toxic inhibiting properties of the new development, THIOSOLVE. This unique formulation has been used successfully in European agriculture for about two and one half years and has been extensively researched in selected areas in this country.

Pittsburgh is proud to present this new, important development in the field of organic phosphate insecticides to American agriculture. Write for detailed technical information now available in bulletin form.

**METACIDE is a trade mark of Chemagro Corporation, New York, N.Y.*

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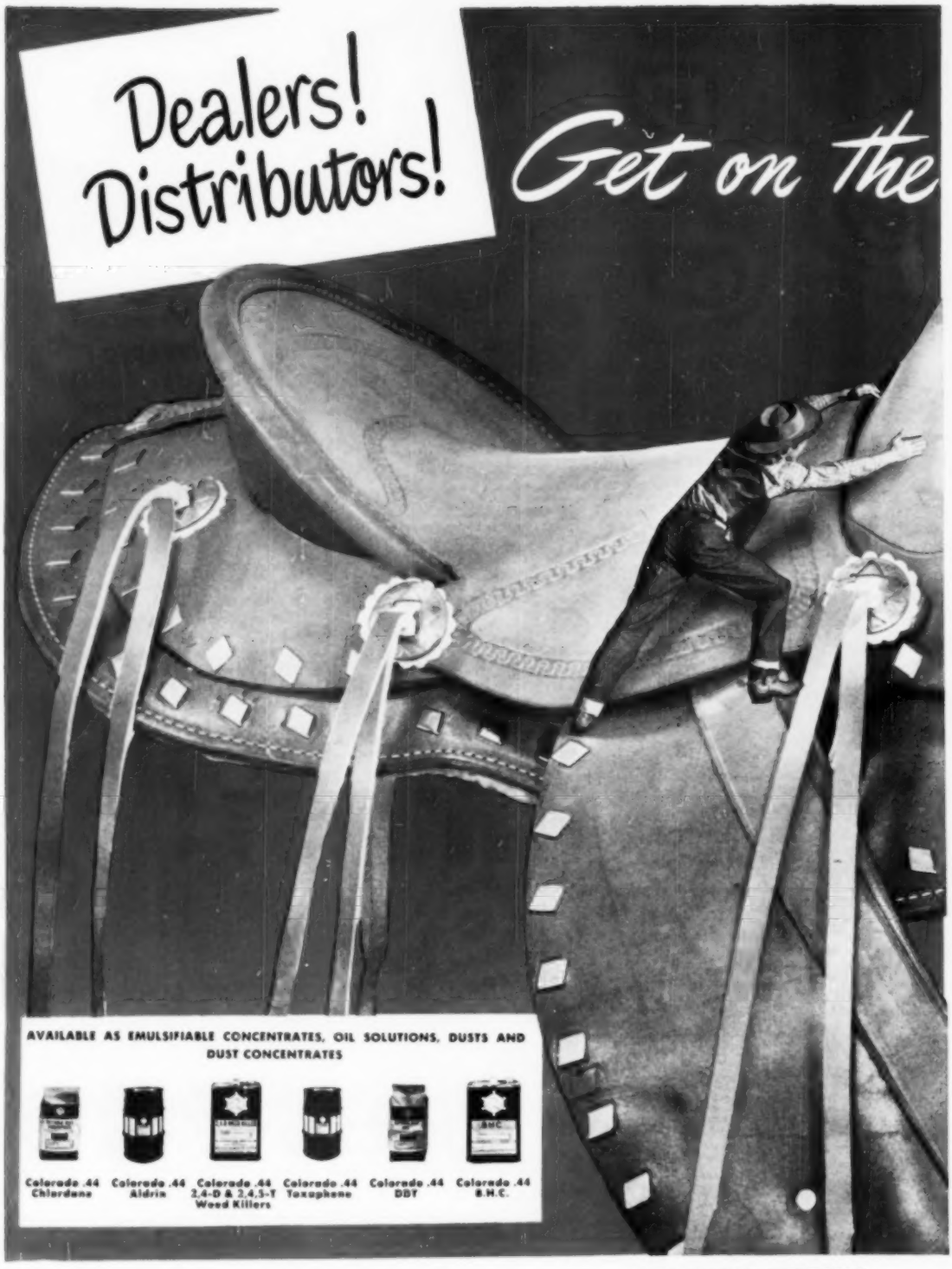
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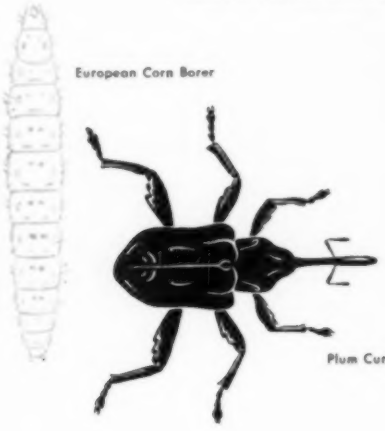
Colorado .44 Toxaphene
Colorado .44 DDT
Colorado .44 B.H.C.

Tomato and Tobacco Hornworm

Cotton Boll Weevil



European Corn Borer

Plum Curculio

Extended Killing Power

ARMOUR STICKER keeps insecticides on the plant longer!

Every year the American farmer spends thousands of dollars for insecticides and fungicides that are washed off the plant foliage before they give maximum protection from insect and disease damage. The use of Armour Sticker now makes it possible to guard against this loss.

Armour Sticker consists of natural animal proteins fractionated and blended to exact specifications for solubility, adhesiveness, light sensitivity and water resistance. According to Crop Protection Institute Bulletin No. 72 by Dr. B. Elwood Montgomery, entomologist at Purdue University, "Chemical analyses indicate the original deposit from a spray or dust on slick foliage such as peach, corn, etc., is increased materially (as much as 100%) by the addition of Armour Sticker to the mixture."

Coverage — Armour Sticker not only increases the deposit of the pesticide, but it also gives more uniform coverage of the foliage. This uniform film results in better control of insects and disease and also reduces burning from "spot-type" deposits.

Reduced Run-Off — Armour Sticker's high initial deposit and even coverage insures a minimum amount of run-off. Chemical analyses, visual ratings and tests of the toxicity of residues to caged insects indicate an improvement in the retention of effective deposits by the addition of Armour Sticker to dusts and sprays.

Weatherability — When an insecticide containing Armour Sticker is applied to foliage and exposed to light for two to three hours, it becomes water-resistant and capable of withstanding rainfall and wind for a prolonged period of time.

Removal of Residues — Armour Sticker's smooth, even cover insures easier residue removal, with either brushing or washing.

Compatibility — Armour Sticker is compatible with all inert materials, as well as all commonly used fungicides and insecticides such as DDT, chlordane, lead arsenate, parathion, methoxychlor, sulphur, mercuric and copper compounds and the carbamates.

Toxicity — Four years of field use has proven Armour Sticker to be non-toxic to plant and animal life.

Armour Sticker is a product of eight years of intensive research and has been tested on all types of crops. For the past two years commercial growers have been successfully using it. Armour Sticker can help extend the killing power of your insecticide, fungicide or herbicide.

Armour Sticker is available in any quantity, packaged in 100 pound containers. Write today for detailed information.

ARMOUR *Adhesive Division*

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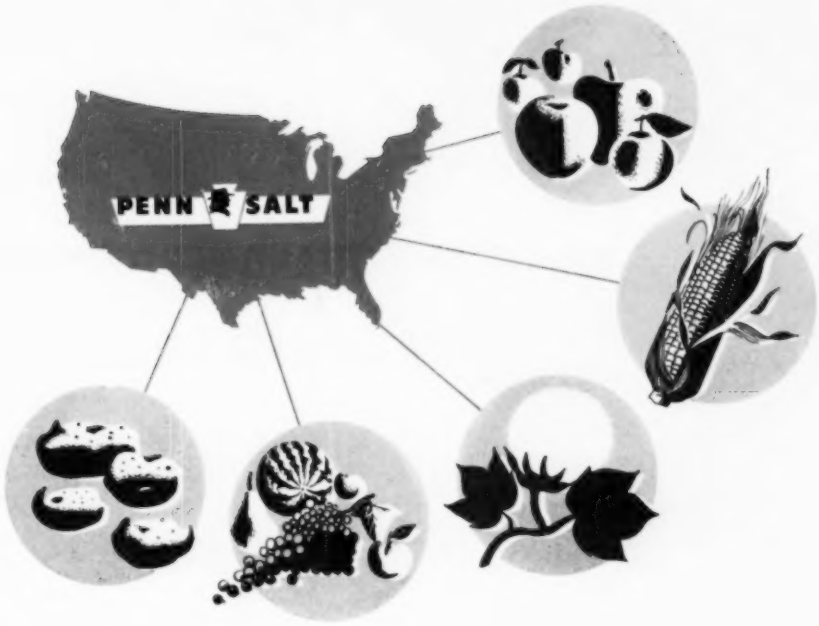

Serving from coast to coast —

Yes, you'll find Pennsalt Agricultural Chemicals on the farm fronts from Coast to Coast.

In Maine and Idaho bigger and better potatoes grow with the aid of Pennsalt potato insecticides. Louisiana and California use Kryocide to control sugar cane borer and orange worm. A Penco insecticide takes the fight out of the destructive corn borer of the Midwest and Penco sprays help protect the fruit crops of the Northwest. Even the tough boll weevil and other cotton insects aren't tough any more after a dusting with Pennsalt's Cotton Insecticides. In short, you'll find Pennsalt Agricultural Chemicals practically everywhere!

In addition, Pennsalt Laboratories continually work toward further improvement in the products they offer to agriculture and to you.

For information on prices and delivery, or technical assistance, write Agricultural Chemicals Department, Pennsylvania Salt Manufacturing Company, Philadelphia 7, Pa. . . . Tacoma, Washington . . . Montgomery, Ala. . . . Bryan, Texas . . . Portland, Oregon . . . Los Angeles, and Berkeley, Calif.

PENN SALT

agricultural chemicals

PROGRESSIVE CHEMISTRY FOR A CENTURY

what big ears cornstalks have when protected with SANTOBANE!

LOOK AT THE [illegible] when corn borers are controlled!

MONSANTO'S DDT

When borers are kept out of corn with Santobane, Monsanto's DDT, ears grow larger.

Those are facts that farmers *know*. For that reason, there will be heavy demand for Santobane next summer when the battle of borers begins again. Better order your supply of Santobane right away. Be ready to profit when demand is heavy.

Santobane is available for shipment by the 100-pound bag or carload. For further information, mail the coupon or contact the nearest Monsanto Sales Office. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1766-L South Second Street, St. Louis 4, Missouri.

Monsanto Insecticidal Chemicals

SANTOBANE® (DDT)
SANTOCHLOR® (para-Dichlorobenzene)
SANTOPHEN® 20 (Pentachlorophenol, Tech.)
TRICHLOROBENZENE, Technical
NIFOS® 7 (Tetraethyl Pyrophosphate, Tech. For agricultural use only)
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2,4-D ISOPROPYL ESTER
2,4,5-T ACID
2,4,5-T ISOPROPYL ESTER
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Here are the startling facts

INCREDIBLE LETHAL POWER!

A few ounces of ALDRIN control boll weevils and grasshoppers on an entire acre!

about ALDRIN

(COMPOUND 118)

2,000,000 POUNDS of ALDRIN* used in 1950 on cotton insects and grasshoppers

Cotton pest control with 4 ounces per acre! Cotton growers are enthusiastic about this powerful new insecticide because of its rapid action and excellent performance against boll weevils, plant bugs, fleahoppers and thrips. All these pests are controlled with a 4-ounce per acre dosage in either dust or spray form.

Grasshopper control with 2 ounces per acre! The three Canadian Prairie Provinces—Alberta, Saskatchewan and Manitoba—used 500,000 pounds of Aldrin in 1950 to combat a very bad grasshopper infestation. Aldrin was the only "hopper stopper" used and excellent control was obtained with a spray containing but 2 ounces per acre. *That's 8 acres of dead grasshoppers per pound of Aldrin!*

Compatible with farm chemicals! Aldrin is entirely compatible with all commonly used insecticides and fungicides. It is the only chlorinated hydrocarbon insecticide that is stable in the presence of strong alkalis. Aldrin does not lose its power on whitewashed surfaces or in lime mixtures.

Plan 1951 Aldrin formulations now! Mail the coupon today for complete details. **Shell Chemical Corporation** is the exclusive national distributor of unformulated Aldrin and Dieldrin which are manufactured by **Julius Hyman & Company.**

*3,400,000 pounds of 60% Aldrin Equivalent Solution.

TECHNICAL GRADE ALDRIN AND DIELDRIN WILL SOON BE AVAILABLE

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GOT RATS IN YOUR BELFRY?

ROUT 'EM WITH Rax

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Rats in the cornfield, two by two; rats in the belfry get them too. Yes, wherever rats are a problem, RAX, the new wonder rat and mouse killer could be the solution to your problem. This remarkable new tasteless and odorless Prentiss product is fast-becoming a universal favorite.

Rax, containing warfarin*, (WARF Compound 42), came out of the Wisconsin Alumni Research Foundation. It kills by producing hemorrhage. Rax is a slow-acting poison; but since it is tasteless and odorless, it is easy to feed to rats and mice. In most cases, it will successfully control a rat and mouse population and then help prevent its rebuilding.

Farmers who used it experimentally have reported easy, economical and safe control of rats and mice on the farm. Results from all over the country indicate that Rax is 85-90% effective in killing rats and mice.

Millions of dollars worth of insecticides and fungicides are used each year to produce our nation's farm crops. But little or nothing is done to protect them from the 150,000,000 rats and untold number of mice that attack these crops in storage. $4,000,000,000 is a big price to pay for this damage. Rats eat or spoil half this amount yearly in cereals and cereal products alone.

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SOLUBILIZERS for 2,4-D and 2,4,5-T

Sharsol 193

Solubilizer for 2,4-D and 2,4,5-T acids. This amine can be used to produce high or low concentrations of either acid—up to 6 pounds per gallon of 2,4-D; up to 5 pounds per gallon of 2,4,5-T.

Concentrates have low freezing points.

6 pounds 2,4-D/gal. does not crystallize at −50°F.
4 pounds 2,4-D/gal. freezes at approx. 8°F.
5 pounds 2,4,5-T/gal. freezes at approx. 0°F.

Resolubility of the 2,4-D concentrates which have frozen is excellent since they go back into solution without agitation.

Sharples Report 50-1 is available upon request.

Sharsol 216

An inexpensive solubilizer for 2,4-D acid. Concentrates of over one pound 2,4-D acid per quart may be made. Freezing point of such concentrates is approximately 27°F.

Sharples Report 50-2 is available.

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SINCE 1847

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a **PREVENTOL, RAMASIT, NULLAPON, COLLORESINE** or other finishing agents

...one source of supply now serves all your needs

More than 30 major industries need one or more of the types of products suggested in the brief listing above. Now all are available from one source. One of these may make your product *easier to sell* or *less expensive to manufacture*.

As of October 1, 1950, Antara Products—General Aniline & Film Corporation was merged with the Organic Chemicals Division of General Dyestuff Corporation.

The new *Antara Products Division of General Dyestuff Corporation*, thus formed, will coordinate and handle the sales and services of all chemicals, intermediates, and allied products made by the General Aniline & Film Corporation.

Extensive research staffs and facilities support the development and application of all Antara Products—available to work with you in the improvement of an existing product or the development of a new one. Your inquiry is invited—without obligation. It will bring a prompt opinion as to whether one of the Antara Products may be adaptable to your needs. Kindly address your inquiry to Department 67.

NOTE: The Dyestuff Division of General Dyestuff Corporation will continue to operate as before, without change in personnel or policy.

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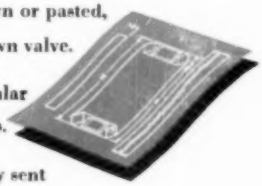
. . . and the strongest, toughest kraft comes from our own mills, made under the watchful supervision of our own master Kraftsmen.

Then, in the most modern plant of its kind, this strong, tough kraft is fashioned into heavy-duty, multi-wall shipping sacks.

We make them in many sizes and many plies, printed or plain, either open mouth or valve, sewn or pasted, flat sewn open mouth or flat sewn valve.



In fact, we make sacks to fit your own particular specifications—or we'll design them to fit special needs.

Now, more products are economically sent to market in the strongest KRAFT all-purpose multi-wall bags yet produced.

You'll find that out when you investigate.

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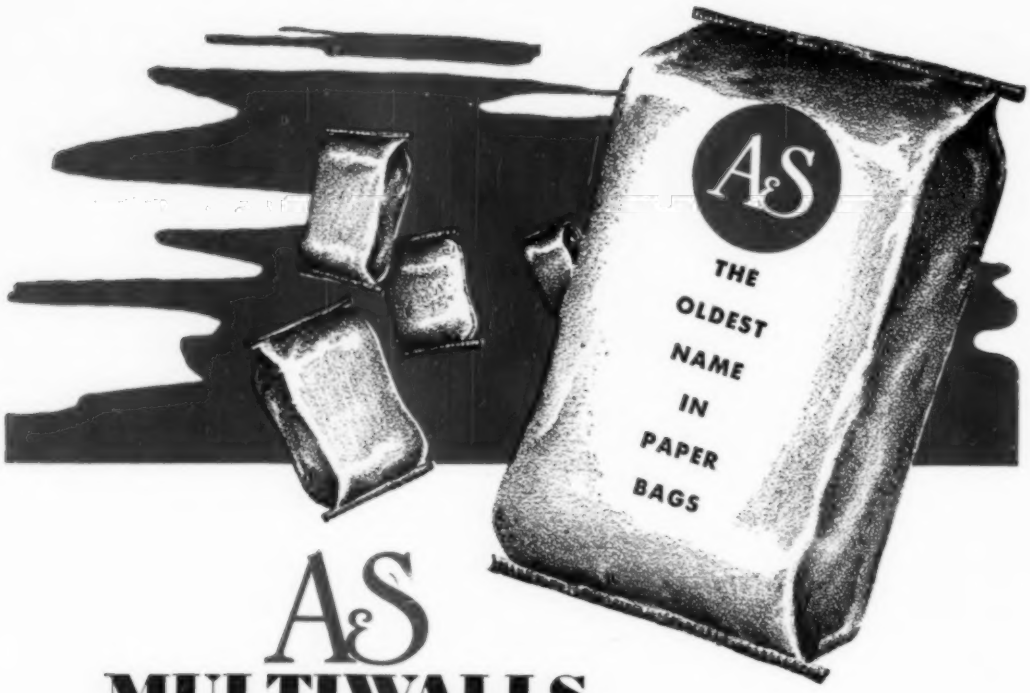

A&S MULTIWALLS *stand* UP *and* OUT!

RECENT DEVELOPMENTS FROM THE A&S PACKAGING LABORATORY

- **EXPENDABLE PALLETS** Palletized shipments of A&S bags lower your handling costs, minimize storage space.
- **STA-STAK BAG** Creped outer wall takes skid and slip out of stacking. Greater resiliency, easier handling.
- **SHUR-CLOSE** Ingenious bag valve assures less dust when packing — less sifting when packed — prevents waste.
- **PLASTO-PAK BAGS** Polyethylene lined, moisture-proof protection for hygroscopic materials with exclusive "Electro-Seal" bottom closure.
- **SUPER GLOSS FLOUR BAG** Toughest of flour bags is bright white with brilliant inks to provide sparkling, appealing shelf packages.
- **ARK-TONE PRINTING** Sharp, clear color process combines perfect reproduction and brightness for consumer packages.
- **HI-TONE PRINTING** Strong, deep colors for sugar, salt, rice and similar bags.
- **PRESSUR-PAK BALE** Bags are packed under pressure. Saves 50% of customers' space allotted to storage.

● A&S Multiwall bags *stand up* under all kinds of shipping and storing abuse, because every ply is made of No. 1 specification kraft, and every bag must pass the rigid A&S spot inspections.

A&S Multiwalls *stand out* because they are printed on modern 6-color presses that reproduce a bag design in eye-arresting colors unsurpassed in commercial bag printing. Why not have our A&S packaging specialists analyze your packages? These men know how to build impact into the flat exterior of what could otherwise be a dull and unimaginative package. This combination of unusual design and faultless printing is yours at no extra cost.

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ARKELL & SMITHS · 90 YEARS OF KNOW HOW · THE OLDEST NAME IN PAPER BAGS ·

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DILUEX

improves formulation Quality

Quality creates Preference

Preference is your answer to

SALES VOLUME and PRICE Q.E.D.

PRODUCTION as well as sales will profit from the use of this better carrier and conditioner in either dust or concentrate formulations. Milling output from a given plant may be remarkably increased, while product quality is improved, for flow—texture—uniformity.

Two grades are offered, according to requirement. Adequate, dependable supplies are available at all times for shipment by either truck or railway from two Floridin plants at Quincy and Jamieson, Florida.

Ask for Samples and Additional Data

FLORIDIN COMPANY

Dept. M, 220 Liberty Street, Warren, Pa.

A Report from Du Pont on

BETTER PRODUCTS FOR FARM PEST CONTROL

Our fields, pastures and orchards are a happy hunting ground for new pests that flare up and for old ones that return as changing conditions favor them.

New and better pest-control products are needed... and proved ones find new uses. Here are some of the ways in which farm chemicals developed by Du Pont research ... new ones and improved ones...are helping farmers to shift their attack successfully.

"DEENATE" 75-W and 75-P DDT

These concentrated new Du Pont formulations of DDT have several new advantages plus the same outstanding characteristics that have made "Deenate" DDT (50%) insecticides so effective against codling moth, Japanese beetle, lygus bugs, flies, potato beetle, leafhoppers, flea beetles, Oriental fruit moth and other insects. "Deenate" 75-W wettable powder is easier to use, less bulky to handle, and gives more efficient control of insects through better spray deposits of DDT. Yet this greater deposit of DDT shows less visible residue on the sprayed surfaces. "Deenate" 75-P insecticide gives commercial dust mixers these same numerous advantages of high DDT concentration, and good mixing qualities.

EPN 300 Insecticide

Controls European red mite, two-spotted mite, Willamette mite, Pacific mite, and Schoene mite, and shows promise for control of psylla, plum curculio and certain other insects. Apples, pears, peaches, nuts and stone fruits are among the crops to benefit. EPN 300 gives both quick results and long-lasting control.

DU PONT 2,4,5-T Brush Killers

Proving their power in killing mesquite and other range brush at a cost that's economical on rangeland. They are available in forms especially effective in the growing season and many be used in the dormant season as well . . . to prevent resprouting as well as to kill top growth.

"MARLATE" Methoxychlor Insecticides

Probably the safest residual insecticides yet developed. Du Pont "Marlate" controls a great many kinds of insects on fruit, vegetables and forage crops. It has strong residual power, yet offers little hazard of harmful residues to people and animals eating treated crops. Moreover, it doesn't burn even on tender plants, such as cucumbers, melons or tomatoes.

"PARZATE" Fungicide

Outstanding control of early and late blights of tomatoes and potatoes. "Parzate" also is proving itself a money-maker in control of fungous diseases of spinach, onions, beans, and other vegetables. With spinach, for example, "Parzate" has saved many acres from ravages of white rust and blue mold. And because it is easy on the crop plants, they grow with full normal vigor to produce higher yields as well as outstanding quality.

These are only a few examples of the results farmers are getting from farm chemicals developed, tested and formulated by Du Pont for better pest control. Look to Du Pont for improved farm pest-control products, the "better things for better living . . . through chemistry."

DU PONT CHEMICALS FOR THE FARM INCLUDE:

Fungicides: PARZATE,® (Liquid and Dry), FERMATE,® ZERLATE,® Copper-A (Fixed Copper), SULFORON® and SULFORON®-X Wettable Sulfurs . . . *Insecticides:* DEENATE® DDT, MARLATE® Methoxychlor, LEXONE® Benzene Hexachloride, KRENITE® Dinitro Spray, EPN 300 Insecticide, Calcium Arsenate, Lead Arsenate . . . *Weed and Brush Killers:* AMMATE®, 2,4-D, TCA and 2,4,5-T . . . *Also:* Du Pont Cotton Dusts, Du Pont Spreader Sticker, PARMONE® Fruit Drop Inhibitor, and many others. ® REG. U. S. PAT. OFF.

On all chemicals always follow directions for application. Where warning or caution statements on use of the product are given, read them carefully.

DU PONT

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BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

THE EDITOR COMMENTS

LIKE the proverbial horseshoe nail, loss of which cost a kingdom, shortages in the agricultural chemical field look from here as though they could have a profound effect on next year's supplies of pesticides and fertilizer.

The benzene and chlorine situation, affecting the production of all chlorinated insecticides including DDT, BHC, and other widely used toxicants is likely to be a source of embarrassment for many who expect to order their insecticide materials just before time for actual use next year. Qualified observes in the trade say that many important products will be short then.

In the fertilizer field, the lack of sulfur is a real worry. With estimated needs for 1951 set at 6 million tons and the most optimistic guesses on probable production hitting around the 5.7 million ton mark, manufacturers of superphosphate are wondering what will happen, particularly when other industries are casting envious eyes at fertilizer's large use of the material.

Two safety-valve factors appear, however. These are a possible reduction of the 1,200,000 tons of sulfur being shipped abroad each year, and the possibility of finding new sulfur-producing fields to bolster the supply. Government authorities say that exports can't be cut very much because of E.C.A. commitments . . . that the present rate of shipment must be continued for some time. There is much disagreement with this view in the trade, however, many feeling that it is more important to keep American production strong; particularly agricultural production, than it is to send such large quantities of sulfur abroad in the face of our own supply situation.

So far as locating new sources of sulfur, the producing companies are reported to be spending millions in such exploration, not only in the U. S. but in Mexico as well. Eventually new "domes" are likely to be found, but even so, the situation will remain difficult for some time.

OPENING guns in the testimony before the Delaney Committee, fired last month in Washington, squarely challenged the agricultural chemical industry to prove that there is ample legislative control in the Food and Drug Administration and the United States Department of Agriculture, as well as in the states to afford protection to the public.

Data supporting these facts as well as the history of the industry showing that it has always supported sound legislation, as evidenced by its cooperation in the development of the Federal Insecticide Act, was included in the statement of Lea S. Hitchner, NAC executive secretary, during his appearance before the Committee last month. However, pointed questions from the Committee Counsel, Mr. Kleinfeld, prevented Mr. Hitchner from completing his statement before the Committee although it has been entered as a part of the record. In the opinion of many observes attending the hearing, Mr. Kleinfeld detracted from the dignity and fact-finding nature of the Congressional investigation, by taking the attitude of a prosecuting attorney rather than one seeking pertinent information for the enlightenment of the Committee.

It is also quite apparent from the tenor of the investigation that existing authority under the Food, Drug & Cosmetic Act and the Federal Insecticide, Fungicide and Rodenticide Act are being minimized, in an effort to strengthen the arguments for new legislation. It is also interesting to observe that while invitations have been extended to a wide range of groups, organizations and individuals with an interest in this question, no such invitation had been received by the major farm organizations at the time Mr. Hitchner appeared. In spite of this, plus the fact that agricultural witnesses from the Bureau of Entomology and from the Livestock Branch which administers the Federal Act, were scheduled to appear during the last days of the session

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Approach of A. M. A. to

Health Problems of Pesticides

by

Dr. Bernard E. Conley

THE American Medical Association's approach to the health problems of pesticides is embodied in a six point education and research program.[1] This program is primarily a service activity which is directed towards creating greater public and professional understanding of the economic importance of pest control materials as well as offering guidance to health practitioners in the various difficulties which these agents present. It was recognized from the beginning that the nature and scope of the Committee's undertaking would require a diversified representation of which the medical specialties could provide only a portion of the desired types. Accordingly, specialists in biology, entomology, regulatory work, public health administration as well as those from pharmacology, toxicology and nutrition were invited to the membership.[2]

As would be expected, the major portion of the Committee's program is devoted to the medical problems attendant to the use of pesticides. These include (a) defining the safe conditions of use, (b) proper remedial measures for poisoning resulting from the accidental or intentional misuse of pesticides (c) developing a universal understanding of the dangers inherent in various compounds and their formulation, and (d) the interpretation and application of new knowledge to those health hazards that occur in their manufacture, formulation and utilization in pest control practice.

The mechanisms being utilized to implement this program are, broadly speaking, of two distinct types. The first mechanism is investigative in nature. It requires that the available published information be compiled and evaluated on the toxicity of pesticides. It also requires the collection and analysis of accident reports, and the consideration of such precautionary measures as appear to be needed. Finally, it demands the review of all measures which have been used or show promise of use in the treatment of poisoning from pesticides. The second device is educational in character. It is concerned with promoting the acceptance and application of the findings of a multitude of scattered and seemingly unrelated investigations.

An important aspect of the investigative phase of the Commit-

tee's program is that concerned with the consideration of safe standards of use for pesticides. An increasing amount of safety consciousness is being manifested towards economic poisons. This is apparent not only in the attitude of regulatory officials towards the requirements for development and distribution of pesticides, but also in greater public recognition of the dangers accompanying careless and abusive use of pest control materials. This awareness of certain present and potential health problems created confusion and doubt about a number of the newer chemicals. It has since been shown that these misgivings were not so much the result of being misinformed as they were of our being unprepared to recognize and provide for their basic shortcomings.

The capabilities and limitations of most established pesticides have now been largely determined. We have yet to provide, however, completely satisfactory means by which we may guide the technically uninformed. The suggestion has been made that this could best be approached through the development and promotion of safety standards. Such standards would define those conditions that would provide a reasonable degree of protection against the common chemicals and their several formulations for the various groups who use or are exposed to them.

Serious consideration was given to this suggestion at the exploratory meetings preceding the organization of the Committee. With minor modifications, the proposal for a study of this subject was later adopted. Since then the Committee has endeavored to gather the available data on precautionary measures. Little published information is available on safety standards for pesticides *per se*. It has been necessary, therefore, to review recommended procedures for analogous compounds and to solicit experience data from responsible persons engaged in the major occupations which use these materials.

The Committee's effort in this direction has not been without success. Facts have been compiled on procedures for the handling and application of pesticides, on safety equipment and operating methods, on accident cases and their causes, on methods for the reporting of poisoning, and a miscellany of related subjects. The interpretation and application of this information is a difficult and time consuming task which requires the cooperation of many groups. Our preliminary work assures us that we may anticipate this support.

Antidotes and other measures for the treatment of pesticide poisonings are an intimate part of any study of safety standards. Although knowledge of antidotes and other effective treatment techniques offers only a portion of the answer to the problem of developing protective devices, it still occupies the keystone position. Other factors involved in effective observance of safety measures depend to a considerable degree on adequate knowledge on methods of treatment.

It is not encouraging to learn that specific chemical or physiologic antidotes for the majority of pesticides are unknown. It is even less encouraging to find that dependence is being placed on symptomatic treatments which in some cases are not too effective. The general lack of suitable treatments is not a reproach to the professional accomplishments of pharmacologists or clinicians but rather a reflection of the biologic complexities of the metabolism of these chemicals. It is regrettable that assurance of immediate improvement cannot be made. An early solution to the problem can be found only in a coordinated study to examine all promising avenues of investigation.

The Committee on Pesticides has announced its support of cooperative research on antidotes and is taking an active role in its promotion. By means of a systematic examination of the literature and consultation with investigators inclined toward this work ,we hope to develop an organized approach to this vexing issue. Again, immediate results cannot be expected; nevertheless, by providing leadership and coordinating available knowledge, we believe that some positive results may be provided in the not too far distant future.

The assembly of the various types of information necessary for the preparation of the Committee's reports and the consideration of other projects in its program has been in progress since the summer of 1947. The basic device utilized by the Committee in compiling facts on pesticides is through literature reviews which have been carried out by the staff of the Committee office. In addition technical bulletins and other releases issued by chemical manufacturers, food processors, agricultural experimental stations, federal regulatory agencies and other investigative agencies have been collected and digested for the files. As a third major source, information has been collected through questionnaires and private communications to private and industrial toxicity laboratories, state and local health departments and medical practitioners in agricultural areas. The foregoing information sources are constantly being surveyed to keep our files current.

The Committee's information and education efforts are direct and tangible evidence of medical interest and willingness to be of service. Although it is too early to predict the influence of the Committee's reports, an estimate may be gathered from the following figures: Journal reports are being sent regularly to over 2500 state and municipal health departments, state and county medical societies, state and local pharmaceutical associations and certain private agencies. Another 1000 copies are distributed to scientific workers and other interested persons here and abroad. Abstracts of these reports are also being distributed to 150 leading periodicals in the agriculture, drug and chemical trades. As awareness of the availability of these reports increases, it may be assumed that they

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1. The program of the Committee on Pesticides as announced in the *Journal of the American Medical Association* (*148*: 989, April 1, 1950) included: 1. Promote Safe Standards of Use, 2. Foster the Development of Antidotal Measures, 3. Stimulate Voluntary Control, 4. Assist in the Standardization of Nomenclature, 5. Accumulate and Evaluate New Information, and 6. Undertake an Intensive Education Program.
2. Membership of the Committee includes: Herbert K. Abrams, M.D., E. M. K. Geiling, M.D., Albert Hartzell, Ph. D., Culver S. Ladd, B. Sc., Arnold J. Lehman, MD., S. A. Rohwer, D.Sc., S. W. Simmons, Ph.D., Justus C. Ward, M.Sc., Terald Sollmann, M.D.

Parathion . . .

its action against the Meadow Nematode

MEADOW nematodes, *Paratylenchus* spp., have become a serious threat to boxwood culture whenever this valuable ornamental shrub is found in the United States. Root injury caused by the feeding of these parasites so weakens the plants that they are more susceptible to winter injury and to infection by *Volutella buxi* (Cda.) Berk. and *Macrophoma Candollei* Bet. Br. These fungi normally are considered parasites of weak, unthrifty plants.

Up to the present time, there have been no suitable control measures developed for this disease. The standard recommendation of proper fertilization before each growing season and adequate watering during droughts is designed chiefly to counteract the deleterious effects of feeding of the nematodes, by stimulating root growth of the nematized plants. These recommendations, although of some value, are not wholly satisfactory, for once the plants are subjected to adverse conditions, rootlet production is further retarded and the nematodes destroy rootlets in greater numbers than they can be produced by the plants.

The most effective means of preventing this disease is by a complete exclusion of the parasites from sites on which boxwood is growing. This necessitates the introduction of boxwoods that are in vigorous growth with no trace of nematode infection in the roots to the planting site. The grower should also be extremely wary of introducing other ornamentals in or near an established boxwood planting, for the entire host range of the various species of meadow nematodes that attack box has not yet been determined.

Table 1.
Effect of parathion in controlling meadow nematodes in roots of 5-month-old English boxwoods.

Parathion per pot	Replicate 1	2	3	4	5
0.5g.	0[1]	+	+	+	+
1.0g.	0	+	+	0	+
1.5g.	0	+	0	0	+
2.0g.	0	0	0	0	0
Control	+++	+	+++	+++	+

[1]Index of infection:
+++—heavy
++—moderate
+—light
0—none

Another problem is apparent if the site on which boxwoods are to be planted is already infested with *Pratylenchus*. A possible solution of this problem might be the treatment of the infested area with soil fumigants prior to planting. Its impracticality is apparent, however, when one realizes that soil fumigation, even if properly applied under ideal conditions, will rarely eradicate all of the meadow nematodes in the treated area. The "escapes" could multiply and again become a threat to the normal growth of the plants.

Theoretically, an effective method of control appears to be by chemotherapy of infected plants. This aspect of control has been investigated, particularly with sodium selenite and sodium selenate, but the results obtained were highly variable and regarded as inconclusive.

One of the most effective new organic insecticides to make its appearance during the past 5 years has been parathion, (diethyl p-nitrophenol thiophosphate) or "E 605" as it is known in Europe. Developed orginally at the Elberfeld plant of the I. G. Farbenindustrie in Germany (7), it has been described as an extremely effective insecticide against a wide range of insects (3,4,5,10). Parathion was first used as a nematocide by Raski and Allen (6) who reported that it was toxic to the strawberry spring dwarf nematode, *Aphelenchoides fragariae* (Ritzema Bos) Christie. Dimock and Ford (1,2) have shown that the chemical gives excellent control of the foliar nematode of chrysanthemums, *Aphelenchoides ritzema-bosi* (Schwartz) Stei-

The effect of parathion on growth of weeds in soil treated with parathion 2 months after treatment. (C) control: (1) 0.5g; (2) 1.0g; (3) 1.5g; (4) 2.0g, (5) 2.5g.

by

A. C. Tarjon

Division of Nematology, Bureau of Plant Industry, Soils and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

ner and Buhrer. The following investigations were initiated in order to determine the effect of parathion as a soil amendment on meadow nematodes infecting boxwoods.

Greenhouse Tests

IN the first experiment, parathion was applied at different dosage rates to a group of 20 seven-month-old, meadow nematode-infected dwarf English boxwoods, *Buxus sempervirens suffruticosa* L. Twenty-five per cent wettable parathion powder was used in this and all succeeding experiments. This was mixed with a potting soil mixture of approximately 2 parts soil and 1 part sand at the rates of 2, 4, 8, and 16 grams per cubit foot and the experimental boxwoods were transplanted into these mixtures in 4 in. pots. There were 4 replicate plants per treatment as well as 4 control plants.

After 3 wks. growth, the root systems were washed, cut finely, and immersed in Baermann funnels. After 2 days, a 10 ml. aliquot was drawn from each funnel and the meadow nematodes in each were estimated. It was found that the decrease in the number of meadow nematodes observed was directly proportional to the concentration of parathion in the potting mixture.

Having found that parathion exhibited toxicity to meadow nematodes, a second test was initiated in which five-month-old, meadow nematode-infected plants were transferred into a potting mixture of 1 part sand and 1 part soil in 4 in. pots. Treat-

Table 2.
Comparison of plant weights two months after treatment with parathion.

Parathion per pot	Replicate 1	2	3	4	5	Mean
2.5g.	43.4[1]	62.8	58.2	67.1	78.6	62.0
4.0g.	——[2]	55.2	70.0	55.0	50.4	57.6
5.5g.	29.0	58.2	33.8	——	70.2	47.8
7.0g.	52.6	30.9	——	——	55.5	46.3
8.5g.	——	——	——	——	——	——
Control	44.1	42.8	65.7	43.9	44.0	48.1

[1]Each value represent the percentage gain or loss in weight added to a constant value of 50.
[2]Plants died.

Table 3.
Effect of parathion on meadow nematodes in roots of 10-month-old-English boxwoods.

Parathion per pot	Replicate 1	2	3	4	5	Mean
2.5g.	0	1	0	0	1	0.40**
4.0g.	—[1]	0	3	0	1	1.00**
5.5g.	0	0	0	——	6	1.50**
7.0g.	1	0	——	——	4	1.67
8.5g.	——	——	——	——	——	——
Control	80	74	76	53	68	70.20

**Significant at odds of 99 to 1.
[1]Plants died.

The effect of parathion on root growth of boxwood plants 2 months after treatment. (C) control: (1) 0.5g: (2) 1.0g: (3) 1.5g: (4) 2.0g: (5) 2.5g.

ments of 0.5, 1.0, 1.5, 2.0, and 2.5g. of the chemical in 50 cc. of water were poured over the soil around single plants randomized within 5 replicate blocks; controls received 50 cc. of water. The liquid, in each case, thoroughly wet the soil and roots in each pot without subsequent drainage. Temperature of the soil at the time of treatment was 73° F.

During the 7 weeks following application of treatments and up to the time of harvesting, the herbicidal effect of parathion was noticed by the relative absence of weeds growing in the treated pots as compared to the controls. It was thought that this might be indicative of the persistence of parathion in the soil under greenhouse conditions. However, when later experiments were conducted at higher greenhouse temperatures, parathion in the soil seemed to be dissipated more rapidly as indicated by the earlier appearance of weeds in treated soil than observed previously. The persistence of parathion, therefore, seems to be at least partly dependent upon temperature.

After 7 weeks the plants were removed and an apparent difference in the growth of roots between treatments and controls was noticed. Weights of the plants were recorded and statistically analyzed but differences were not found significant. The roots of each plant were chopped and 2 grams were immersed in water contained in Baermann funnels. After 1 week, 10 ml. aliquots were drawn from each funnel and the numbers of meadow nematodes contained were rated as "heavy," "moderate," "light," or "none." Table 1 shows that the number of meadow nematodes decreased with an increasing concentration of parathion. There were no meadow nematodes observed from the roots of plants receiving 2.0 and 2.5 g. treatments. Despite the fact that relatively heavy concentrations of parathion were applied to the plants, there was no evidence of injury.

A third experiment was designed in an attempt to obtain the same degree of control of meadow nematodes as obtained in the previous experiment, and also to determine what the lethal dosage is, of 25 per cent wettable parathion for English boxwoods.

Thirty 10-month-old, meadow nematode-infected plants were removed from pots, washed, and individually weighed. They were then replanted in 5 in. pots in a mixture of 2 parts soil to 1 part sand. Treatments of 2.5, 4.0, 5.5, 7.0, and 8.5 g. of parathion in 50 cc. of water were applied as soil drenches to single plants randomized within 5 replicate blocks. Control plants received 50 cc. of tap water. Soil temperature at time of treatment was 83° F.

Treated plants were allowed to grow for 8 weeks since Granger and Ieiby (4) have shown that in some cases the maximum effect of parathion is reached only at 8 weeks after treatment. Parathion was lethal to 1 plant in each of the 4.0 and 5.5 g. treatments, to 2 plants in the 7.0 g. treatment, and to all plants in the 8.5 g. treatment. After 8 weeks, plants were weighed and, to avoid negative values, the percentage increase or decrease in weight was added to a constant value of 50 and computed. In table 2 it can be seen that the mean weight per plant of the 2.5 g. treatment was considerably higher than the corresponding mean weight of the control plants. These results, however, were not statistically significant.

The root system of each plant was finely chopped and 2 grams were immersed in water in Baermann funnels. Ten ml. aliquots were drawn 3 times weekly for a period of three weeks and combined in a covered beaker with the addition of a few drops of commercial formalin to inhibit bacterial decomposition of the nematodes (9). A 5-ml. aliquot was then drawn from the thoroughly agitated contents of each beaker and put in specially marked Syracuse watch glasses, and the meadow nematodes were counted. Table 3 shows that the 2.5 g. treatment had a mean count of 0.4 meadow nematodes as compared to the controls which had a mean count of 70.2 meadow nematodes. These results were significant at the 1 per cent level.

Table 4.
Percentage decrease of meadow nematodes in roots of parathion-treated 14-year-old nursery-grown boxwoods.

Parathion per plant	Replicate 1	2	3	4	5	Mean
1 lb.	95	95	100	96	89	95**
1.5 lbs.	81	100	99	100	100	96**
2.0 lbs.	79	100	94	100	50	85
Control	—37	20	72	40	36	26

**Significant at odds of 99 to 1.

Field Tests

HAVING found that 25 per cent wettable parathion was effective in significantly reducing meadow nematode populations in roots of youth English boxwood plants under greenhouse conditions, a comparable experiment was conducted on 14 - year - old, meadow nematode-infected boxwoods growing in a nursery situated within the Plant Industry Station, U. S. Department of Agriculture, Beltsville, Md. during the summer of 1949.

Since 2.5 g. of parathion were found to be the most effective dosage in previous experiments, the amount of the chemical to be applied within an area having a 2 ft. radius around the trunk of each plant and to a depth of 6 inches was calculated to be 693 g. or a little more than 1½ lbs. per plant. Prior to treatment, root samples were taken from each plant and a determination of the meadow nematode populations within the root systems was made by the modified Baermann technique described previously.

Circular areas as described above were cleared of all vegetation and debris and treatments of either 1, 1½, or 2 lbs. of parathion were sprinkled evenly over the cleared areas. Treatments were applied at random to single plants within 5 replicate blocks. After application of

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Glossary of Modern Herbicide Terminology

INTEREST in chemical weed control is not limited to weed control scientists alone, as has been demonstrated over the past several seasons. Hundreds of manufacturers, wholesalers, dealers and users have become conscious of the progress made in the herbicide field and have shown an active interest in learning more about it.

The fertilizer industry, too, has a stake in chemical weed control because it offers opportunities for increasing the efficiency of chemical fertilizer applications and the profits from their use. Experience has taught that chemical weed control reduces the acre cost of crop production; eliminates competition between weeds and crop plants for nutrients and water, and increases the value of harvested crops because of absence of weeds and weed seeds.

Chemical weed control, as such, is not a new practice; but the late introduction of new compounds and different methods of application have attracted a rapidly expanding interest and resulted in the adoption of chemical weed control as a regular procedure in the production of many crops.

It is natural that such quick growth and acceptance of new herbicides by so many persons should result in confusion. New terminology in the form of chemical names, botanical terms, and an array of compound numbers and trade names have made the misuse of these complicated compounds inevitable. And, as has been noted in the past, misuse can result in heavy losses of crops.

In order to clarify some of the terminology used in connection with herbicides and their effect on plants, the following glossary of names and a brief definition is presented. This work, prepared by a committee of six,* is offered with the hope that eventually complete understanding may be achieved and uniformity of usage of terms may achieved. The committee realizes that the list is no doubt incomplete, but it hopes to add new information subsequently.

GLOSSARY

Abscission—The formation of a layer of cells which causes the fruit, leaf, or stem to fall off the plant.

Annual—A plant that lives only one year.

Aquatic—A plant that grows in water.

Aromatics—Compounds derived from the hydrocarbon benzene (C_6H_6).

Biennial—A plant that completes its growth in two years. The first year it produces leaves and stores food. The second year it produces fruits and seeds.

Boiling Point—The temperature at which a liquid boils.

Boiling Range—The range of temperatures over which a mixture or an impure compound boils.

Blanket Application—An application of spray or dust over an entire area rather than only on rows, beds or middles.

Brush Control—Control of low-growing herbaceous and woody plants.

Carrier—The liquid or solid material added to a chemical compound to facilitate its storage, shipment or use in the field by means of increasing the bulk. (See also "diluent.")

Chlorosis—A yellowing of plant foliage which results from the halting of the development of the green coloring matter.

Compatible—Two compounds are said to be compatible when they can be mixed without affecting each other's properties.

Contact Herbicide—An herbicide which causes the rapid death of those plant cells, or tissues, with which it comes in contact.

Cotyledon Leaves—The first leaf, or pair of leaves, depending on whether the plant is monocotyledonous or dicotyledonous, developed by the embryo of seed plants.

Crown—The point where stem and root join in a seed plant.

*Members of the committee are: M. V. Bailey, American Cyanamid Co., New York; H. H. Tucker, director, Coke Oven Ammonia Research Institute, Columbus, Ohio; M. H. McVickar, National Fertilizer Association, Washington, D. C.; Leroy Donald, Lion Oil Co., El Dorado, Arkansas; E. N. Carvel, Valiant Fertilizer Co., Laurel, Del.; and Wallace Macfarlane, Pacific Guano Co., Los Angeles, Calif. This group is the sub-committee on chemical weed control, which is part of the Plant Food Research Committee of the National Fertilizer Association.

Culm—The jointed stem of a grass which is usually hollow except at the nodes or joints.

Cutin—The waxy, fatty material that forms the cuticle, or waxy layer, covering the leaf of a plant.

Defoliator or Defoliant—A compound which causes the leaves, or foliage, to drop from the plant.

Dicot (dicotyledon)—A plant that has two seed leaves or cotyledons. Generally includes the broad-leafed plants. Leaves are not veined.

Diluent—Any liquid or solid material serving to dilute or carry an active ingredient.

Directed Application—An application of spray or dust to a restricted area such as a row, or bed at base of plants.

Emergence—The time when the first leaves of the crop plant come through the ground.

Emulsifying Agent—A material which facilitates the suspending of one liquid in another.

Emulsion—A mixture in which one liquid is suspended in minute globules in another liquid; for example, oil in water.

Epinasty—The twisting or curling of leaves and stems caused by uneven growth of cells. (A state of growing in leaves in which the upper surface grows faster than the lower surface and thus causes the leaf edges to curve down.)

Fibrous Root System—One composed of profusely branched roots with many lateral rootlets with no main or tap root developed.

Fungicide—A chemical used for killing fungi.

Hard Water—Water which contains certain minerals, usually calcium and magnesium sulfates, chlorides or carbonates, in solution to the extent of causing a curd, or precipitate, rather than a lather, when soap is added.

Herbaceous—A more or less soft or succulent plant that does not develop wood tissue.

Herbicide—A chemical used for killing plants.

Internode—That part of a stem between the joints or nodes.

Jointing Stage—The stage when grass stems begin elongating.

Leaf Blade—The expanded flat portion of a leaf.

Miscible—Two or more liquids which, when mixed together, form a uniform mix.

Moncot (moncotyledon)—Any seed plant having a singly cotyledon or seed leaf. Includes corn and grass-type plants. Leaves are mostly paralled veined.

Necrosis—The death of all or a part of the plant.

Node—The joint in a stem.

Panicle—A group of flowers borne at unequal distances from the central stem, as in orchard grass.

Perennial—A plant that continues to live from year to year. In many cases, in cold climates, the stem dies down but the root persists.

Petiole—The slender stem that supports the blade of a foliage leaf.

pH Value—An expression of the degree of acidity or alkalinity. The pH scale of numbers 0 to 14 expresses intensity of acidity or alkalinity in the same manner that degrees in the thermometer express intensity of heat. The pH value of 7.0, halfway between 0 and 14, is the neutral point. A solution having a pH of 7.0 is neither acid nor alkaline. pH values below 7.0 indicate acidity with its intensity increasing as the numbers decrease. Conversely, pH values above 7.0 indicate alkalinity with its intensity increasing as the numbers increase.

Phytotoxic—A substance poisonous to plants.

Post-emergence Treatment—Any treatment made after the crop plants emerge.

Pre-emergence Contact Treatment—Any treatment made after weeds are up but before the seeded crop emerges.

Pre-emergence Treatment—Any treatment made before the leaves of the young crop plant come through the soil. (Usually made after planting the crop.)

Pre-planting Treatment—Any treatment made before the crop is planted.

Pubescent—Hairy stems or leaves.

Quick-breaking Emulsion—An emulsion in which the components separate rapidly.

Rhizome—Underground root-like stem that sends out roots and leafy shoots.

Rootstock—Same as Rhizome.

Selective Herbicide—One which has more toxic action on weeds than on the cash crop in which the former are found. By this means weeds may oftentimes be controlled without damage to the cash crop.

Soft Water—Water which does not contain those minerals that prevent free lathering when soap is added.

Stem—That part of the plant above ground which supports leaves, flowers, and fruit.

Stolon—Runners or slender stems that develop roots and shoots at the tip or nodes as in the strawberry plant.

Stool—To throw out shoots—to tiller.

Suspension—A liquid or gas in which very fine solid particles are dispersed, but not dissolved.

Synergism—Cooperative action of different agencies such that the total effect is greater than the sum of the two effects working independently.

Systemic Herbicide—A compound which is translocated readily within the plant and has an effect throughout the entire plant system.

Tap-root System—One characterized by a primary or main root which grows vertically downward with few lateral fibrous rootlets.

Tillers—To form a number of stems or shoots from a single seed—as in wheat.

Translocation—Transfer of food or other materials from one part to another in plants.

Vapor Pressure—That property which causes a chemical compound to evaporate.

Vegetative Growth—Any above-ground parts of the

plant, such as leaves and stems, not directly involved in reproduction.

Volatile—A compound is said to be volatile when it evaporates, or vaporizes (changes from a liquid to a gas) at ordinary temperatures on exposure to the air.

Wetting Agent—A compound which when added to a spray solution causes it to spread over and wet plant surfaces more thoroughly.

Winter Annual—A plant that starts from seed germination in the fall, lives over winter and completes its growth, including seed production, the following season.

Woody Plants—Plants that develop woody tissue.

CHEMICAL COMPOUND

A-A—allyl alcohol

Ammate—ammonium sulfamate

Arsenious compounds—arsenic trioxide
sodium arsenite

Borax—sodium borate
sodium metaborate
sodium pentaborate
sodium tetraborate

Cyanamid—calcium cyanamide

Dinitros—sodium dinitro ortho cresolate
dinitro ortho secondary amyl phenol
dinitro ortho secondary butyl phenol
ammonium dinitro ortho secondary butyl phenate
ammonium dinitro ortho secondary butyl phenol

IPC—isopropyl-N-phenyl carbamate

PCP—pentachlorophenol
sodium pentachlorophenate

Oils—(See Hydrocarbons)

PMAS—phenyl mercuric acetate
phenyl mercury monoethanol ammonium acetate
phenyl mercury triethanol ammonium lactate

Cyanate or P.C.—potassium cyanate

Chlorate—sodium chlorate

N.I.X.—sodium isopropyl xanthate

TCA—sodium trichloroacetate

2,4-D—2,4-dichlorophenoxyacetic acid

2,4,5-T—2,4,5-trichlorophenoxyacetic acid

M.C.P.—2 methyl-4 chlorophenoxyacetic acid

Sulfasan—ethyl xanthogen disulfide

NaCl—sodium chloride

Thiocyanates—ammonium thiocyanate
potassium thiocyanate

Hydrocarbons—Compounds consisting essentially of carbon and hydrogen. The important classes of hydrocarbons are paraffins, naphthenes, olefins and aromatics. Ordinary commercial products, derived from crude oil, are normally made up of these four classes of compounds in varying proportions. The four may be described as follows:

Paraffins—They form the chief constituent of American petroleum and may be considered as hydrocarbon molecules made up of units of methane, or natural gas, in long chains.

Naphthenes—These are cyclic paraffins, comprising about one-fourth of the world's crude oil.

Olefins—Generally present in crude oil distillates in minor concentrations. They are unsaturated straight chained or cyclic compounds.

Aromatics—Term used to define compounds having a ring structure comprised of alternating double and single bonds.

Kerosene—Commercial kerosene is a refined petroleum distillate, essentially waterwhite with a boiling range of 150-300 degrees C. (300-375 degrees F.)

Naphtha—Petroleum naphtha is a light oil product having properties intermediate between gasoline and kerosene, generally with a boiling point in the 200-400° F. class.

Fuel Oil—A fuel oil may be any liquid or liquifiable petroleum product burned for the generation of heat or power. They are defined as oils with a flashpoint above 100° F. and include the four types of oil listed below:

(1) **Residual fuel oil**, with lower boiling constituents recoved by distillation.

(2)**Distillate fuel oils**. This type is derived directly or indirectly from crude petroleum by distillation.

(1) **Crude petroleums** or weathered crudes of low commercial value also form a source of fuel oil.

(4) **Gas oil**, loosely defined as a liquid petroleum distillate having a viscosity intermediate between that of kerosene and lubricating oil.

NOZZLES

Nozzle body—a threaded piece, usually standard pipe threads, having a pocket at one end for the strainer and other parts.

Nozzle strainer—a cylindrical, cone-shaped or flat piece of screening generally about 100 mesh size.

Nozzle orifice tip—a cylindrical, cone-shaped or flat piece of metal, having a small hole, accurately drilled, to deliver a certain volume per unit time at specified pressures.

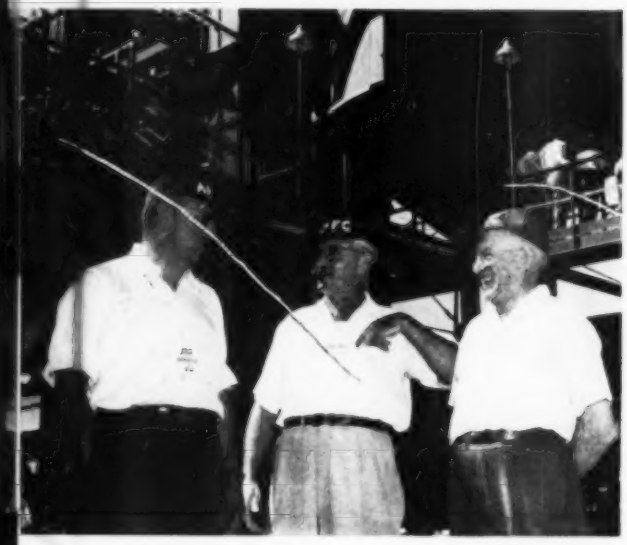
Nozzle retainer nut—usually a hexagonal threaded piece which fits over and holds the nozzle tip in place.

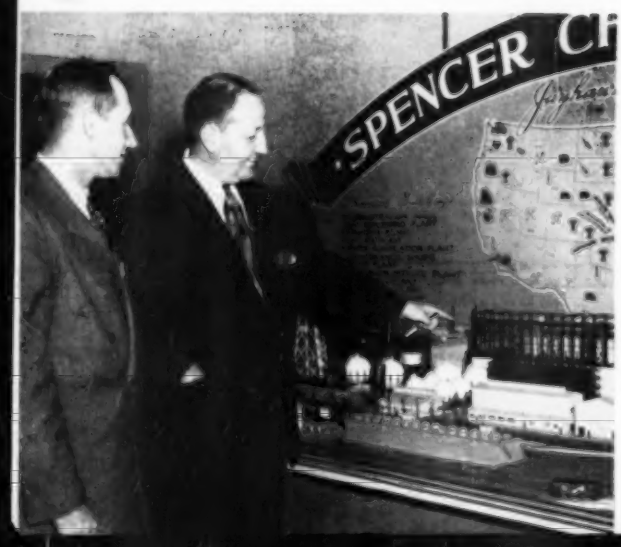
Reprints

Limited quantities of reprints of this glossary will be available soon from the National Fertilizer Association, 616 Continental Building, Washington, D. C.

Address all correspondence regarding reprints to the NFA, care of Dr. Malcolm H. McVickar.

APFC





TO acquaint a group of agricultural editors with the broad scope of the fertilizer manufacturing industry in America, The American Plant Food Council recently invited sixteen editors of as many nationally-known farm magazines, on a 4,000-mile inspection trip. The tour began in Chicago, going directly to Tampa, Florida, where the phosphate mining and processing operations of American Cyanamid Co., Armour Fertilizer Works and the Virginia-Carolina Chemical Corp., were visited. From Tampa the editors flew to El Dorado, Arkansas where they visted the nitrogen manufacturing plant of Lion Oil Company.

The next hop took the men to Carlsbad, N. M. to inspect the mining and refining operations of U. S. Potash Company and the Potash Company of America.

Top photo, this page: Part of editorial group on chartered plane between Chicago and Tampa. Front row, (L to R): Jim Thomson, managing editor, Prairie Farmer, Chicago; Merrill Gregory, managing editor, Wallaces' Farmer & Iowa Homestead, Des Moines, Ia.; J. R. Taylor, Jr., APFC, and C. L. Mast, Jr., editor, Agricultural Leaders' Digest, Chicago. 2nd row: Jim Roe, managing editor, Successful Farming, Des Moines, Ia.; Ray Yarnell, editor, Capper's Farmer, Topeka, Kans.; and Earl McMunn, editor, Ohio Farmer, Cleveland.

Back row, standing: W. H. Kircher, associate editor, The Farmer, St. Paul, Minn.; and Milon Grinnell, editor, The Michigan Farmer, East Lansing, Mich.

Center photo: Joseph A. Howell, president, Virginia-Carolina Chemical Corp., Richmond, Va., whose Tampa operations are being visited by the group: Frank Holland, manager, Florida Agricultural Research Institute, Winter Haven, Fla.; and W. C. Lassetter, vice-president and editor of The Progressive Farmer, Memphis, Tenn. (Not in photo): Fred J. Wood, chm., APFC Fla. Industry Committee, who arranged for phosphate tour.

Left: Nitrogen operations at Spencer Chemical Company's Pittsburg, Kans. plant were included on tour. Kenneth A. Spencer, president of the company points out to Dr. J. R. Taylor, American Plant Food Council agronomist, the tour to be taken by the group the following day.

Host to agricultural editors on 4,000 mile fertilizer industry tour

Heading eastward again, the plane brought the group to Pittsburg, Kansas where the nitrogen manufacturing plant of Spencer Chemical Co. was inspected thoroughly.

Last stop was at Dubuque, Iowa, where the modern mixed fertilizer plant of Virginia-Carolina Chemical Co. was visited.

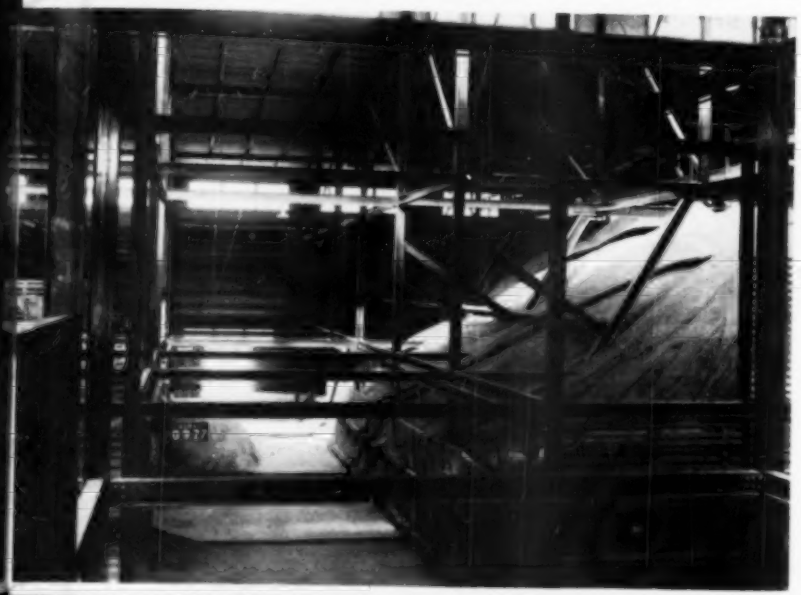
Commentng on the trip, the editors termed it the "most informative and best conducted of any in which they had ever participated before." It was also called a "fertilizer short course" by the travelers.

On the tour, in addition to Dr. John R. Taylor, Jr., APFC agronomist and Louis H. Wilson, Director of Information for the Council, were the following editors, whose magazines reach 33,000,000 farm family readers: Jim Thompson, managing editor, *Prairie Farmer*, Chicago; Merrill Gregory, managing editor, *Wallaces' Farmer & Iowa Homestead*, Des Moines; Ray Yarnell, editor, *Capper's Farmer*, Topeka, Kansas; Earl McMunn, editor, *Ohio Farmer*, Cleveland; W. H. Kircher, associate editor,

Top photo: Open house for editors at Lion Oil Company's nitrogen plant, El Dorado, Arkansas brought out top officials. Photo shows Col. T. H. Barton, chairman of the board of Lion Oil Co.; R. W. Goldthwaite, Lion Chemical sales representative; Jim Roe, managing editor, Successful Farming, Des Moines, Ia.; and A. F. Reed ,vice-president, Lion Oil Co., and member of A.P. F. C. executive committee.

Second photo, taken at Potash Company of America operations, Carlabad, N. M. (Left to Right) M. C. Gilpin, editor, The Pennsylvania Farmer, Harrisburg, Pa.; Jim Roe; Ralph D. Wennblom, Associate editor, Farm Journal, Philadelphia; Ferdie Deering, editor, The Farmer-Stockman, Oklahoma City, Okla.; Earl McMunn, and Ray Yarnell.

Bottom picture: Loading shuttle car with ore a thousand feet underground at mines of U. S. Potash Co. Editors looking on at the operation are, (L to R): Merrill Gregory; Jim Roe; Dr. Paul D. Sanders, editor, The Southern Planter, Richmond, Va.; and Milon Grinnell.



The Farmer, St. Paul, Minn.; Milon Grinnell, editor, *The Michigan Farmer*, E. Lansing, Mich.; W. C. Lassetter, vice-president and editor of the *Progressive Farmer*, Memphis, Tenn.; C. L. Mast, Jr., editor, *Agricultural Leaders' Digest*, Chicago; Arnold Nicholson, managing editor, *The Country Gentleman*, Philadelphia; Eugene Meyer, associate editor, *Hoard's Dairyman*, Ft. Atkinson, Wisconsin; L. R. Neel, editor, *Farm & Ranch, Southern Agriculturist*, Nashville, Tenn.; Paul D. Sanders, editor, *The Southern Planter*, Richmond, Va.; Ralph D. Wennblom, associate editor, *The Farm Journal*, Philadelphia; Ferdie Deering, editor, *The Farmer-Stockman*, Oklahoma City, Okla.; M. C. Gilpin, editor, *The Pennsylvania Farmer*, Harrisburg, Pa.; and Jim Roe, managing editor, *Successful Farming*, Des Moines, Ia.

(All photos on pages 38, 39, and 40 as well as the front cover, by Louis H. Wilson director of Information of the American Plant Food Council Washington, D. C.)

Photos, This Page

A $700,000 dragline was one of the attractions of the editors' tour. This monster is used at American Cyanamid Company's operations in Florida, in mining phosphate rock.

Middle Photo: the eight-day tour of industry operations which took editors to the phosphate mines and processing plants, to potash mines and refining operations and to nitrogen manufacturing facilities, the farm magazine editors went to Dubuque, Iowa, to see Virginia-Carolina Chemical Corporation's modern mixed fertilizer plant. Shown above is a view of the storage facilities in the new plant.

Lower photo: Airplane view of modern triple superphosphate plant operated by Armour Fertilizer Works, Bartow, Florida.

Nat'l Fertilizer Assn.

Holds annual fall meeting in Mississippi; Panel discusses pros and cons of high analysis fertilizers.... Totman says industry to produce adequate materials if supplies hold

FEATURING a symposium on the question of high analysis fertilizers, the National Fertilizer Association held its annual Fall meeting at the Edgewater Gulf Hotel, Edgewater Park, Miss., November 13-15. A registration of some 450 was recorded to mark the meeting as being successful in its first venture away from Atlanta, Ga., where previous fall sessions were held.

The meeting proper was opened by a keynote address by J. E. Totman, Summers Fertilizer Co., Baltimore, chairman of the NFA board of directors. He told the group that although the industry has abundant capacity to meet every likely demand, the ability to store manufactured goods has not kept pace with increased production, and urged industry representatives to urge early deliveries and to persuade customers to store fertilizer on their own farms. With consumption more than doubling during the past ten years, he said, storage capacity for this added tonnage just is not available . . . and goods must be moved from factory to farm quickly in order to take full advantage of the industry's manufacturing capacity.

The board chairman reminded the group also that lack of sulfur is the most serious factor in the supply picture at the present time. He said that the amount of sulfur obtainable for the manufacture of sulfuric acid for superphoshate production is not known at present, but unless exports are curtailed further, 'it seems certain that there will be a reduction of from 10 to 20 percent in the amount of sulfur that can be furnished to domestic sulfuric acid plants." He added that the possible 20 percent shortage will probably be reduced in direct proportion to any decrease in exports.

"Were it not for the sulfur uncertainty and other possible repercussions from the present emergency it seems assured that all three of the primary plant foods could be obtainable in sufficient quantities to meet all of our needs," he declared. "Barring these unknowns, it appears that some 15 percent more nitrogen, at least 10 percent more phosphoric acid and some 15 percent more potash than was used last year could be produced in this present fertilizer year."

Explaining further the supply outlook for 1951, Mr. Totman reminded that U. S. defense will have first call on nitrogen should the plants still under government operation be unable to produce defense needs. Sulfur is also a defense "must" and any unusual use may well still further affect sulfuric acid supplies for superphosphate, he declared. Regarding other fertilizer materials, he said that no immediate effect on potash appears, but transportation and labor are all important here—even more so than in the case of nitrogen and phosphoric acid.

Members of the Board and officers of The National Fertilizer Association photographed at the 24th fall meeting of the Association.

Left to right, seated: Walter E. Meeken, Boston, Mass.; B. B. Fall, Portland, Conn.; E. S. Russell, South Deerfield, Mass.; John A. Miller, Louisville, Ky.; F. S. Lodge, Acting Secretary, NFA.; J. E. Totman, Baltimore, Md., President, NFA Board of Directors; Russell Coleman, President, NFA.

Standing C. D. Shallenberger, Shreveport, La.; (hidden) M. G. Field, Hattiesburg, Miss.; R. D. Martenet, Indianapolis; E. B. Helgeson, Seattle, Wash.; M. S. Hodgson, Athens, Ga.; Weller Noble, Berkeley, Calif.; L. Graham Campbell, Cranbury, N. J.; C. R. Martin, Dayton, Ohio; J. L. Nichols, Sumter, S. C.; A. A. Schultz, Reading, Pa.; J. H. Epting, Leesville, S. C.; T. W. Allen, Attalla, Ala.; E. A. Geoghegan, New Orleans, La.; Ray L. King, Valdosta, Ga.; J. H. Owens, Roanoke, Ala.; John E. Powell, Columbus, Ohio; M. H. Lockwood, Chicago, Ill.; Moultrie J. Clement, Pensacola, Fla.; C. T. Prindeville, Chicago, Ill.; and James W. Dean, Knoxville, Tenn.

Mentioning new departures in fertilizer manufacture and distribution, Mr. Totman said that many of these are too new to evaluate, and advised an attitude of "stop, look and listen" before going too far with the untried methods. He said that a number of self-propelled machines have been placed on the market for applying limestone, phosphate rock and mixed fertilizers broadcast to the soil. "Some of them are designed to apply accurately, amounts as little as 100 pounds per acre," he reported, and pointed out further that this should be important for the application of mixed fertilizers to pastures and haylands, and perhaps to top dressing of small grains. Row crops, however, will, require more consideration, he said. "Some fertilizer companies are contracting to apply mixed fertilizers to the farmer's soil with such machines.

The board chairman mentioned also airplane distribution of fertilizers in cases when non-row crops need fertilization at times when the condition of the soil makes ordinary machine application difficult. Spring top dressing of small grains and rice are notable examples, he pointed out, as are grazing areas of rough terrain. Such applications of poisons for insect control and selective herbicides are also proving effective. As to the introduction of insecticides and herbicides into fertilizer mixtures so that the mixture may be applied in one operation, Mr. Totman advised extreme caution in this direction. "Too little is known yet about the interreaction of such mixtures and particularly their residual effect," he warned. "Any bad results . . . may cause the blame to be thrown improperly against the fertilizer." He concluded by remarking that these facts indicate increasing responsibilities for the fertilizer industry.

Nutrition Improved

DR. Jackson B. Hester, soil Technologist of the Campbell Soup Co., told the NFA assembly that despite rather numerous claims to the contrary, the use of commercial fertilizers is *improving* the quality of food for human consumption, instead of lowering it. Presenting his talk, "Beyond the Food Horizon," Dr. Hester declared that the fertilizer industry benefits more people, directly and indirectly, than any other industry. He named some of the beneficiaries of this endeavor as being chemists, manufacturers, transportation companies, the U. S. Department of Agriculture, and the great mass of people the world over who gain better nutrition from the fertilizer industry's efforts.

In the photos: Top, (L to R): J. A. Naftel, Pacific Coast Borax Co: M. W. Cole, James C. Jett Co.: and W. W. Johnson, Smith-Douglass Co.

2nd photo: H. H. Tucker, Coke Oven Ammonia Research Bureau, Columbus, Ohio: Thomas Counce, Chase Bag Co., New Orleans, La.: and Gus Ashcraft, Ashcraft-Wilkinson Co., Atlanta, Ga.

3rd photo: Mr. & Mrs. Wm. Merritt, Ashcraft-Wilkinson Co., Atlanta, flanked by two friends at the Mississippi convention. (The Agricultural Chemicals cameraman reports that Gremlins, or something, swiped from his briefcase the paper noting the names of this pair, and all attempts at identification failed!)

4th: A. Wilkinson, Consolidated Mining & Smelting Co., Trail, B. C., Canada: Kenneth Keith, Spencer Chemical Co., Kansas City, Mo.: and G. Colla, of Consolidated of Canada.

5th: A. A. Schultz, Reading Bone Fertilizer Co., Reading, Pa. and Graham Campbell, Chamberlin & Barclay, Cranbury, N. J.

Below, (L to R): Judge D. S. Murph, retired secretary of N.F.A. talking to Dr. W. R. Thompson,Mississippi State College: (That's Wayne Mills in the background). Claude Byrd, Spencer Chemical Co., Dr. Charles Simmons, Agronomy Dept., University of Alabama: and Mr. and Mrs. Kintchen O'Keefe, Southern Agricultural Fertilizer Co., Clarksdale, Miss. Mr. O'Keefe is mayor of Clarksdale, incidentally. Last photo: Leroy Donald, Lion Oil Co., El Dorado, Ark.: S. Borden Chronister, Barrett Div., Allied Chemical & Dye Co., New York: and J. E. Adams, Texas A & M.

He related how the public is becoming more and more conscious of and interested in human nutrition and health as affected by plant food. That many groups which influence public opinion are interested in knowing more about this angle of the question, was brought out by the speaker, who declared that editors, civic groups and others show great interest in the subject. He regretted that some opportunities have been lost by the commercial fertilizer industry in allowing the organic farming cult to bring its message to the public through the medium of newspapers, magazines and community meetings. People need to know the importance of commercial fertilizers in feeding the world, he emphasized.

Projecting slides on a screen, Dr. Hester showed numerous examples of how plants react to nutrient-deficient soils, and described various ways of fertilization to overcome such deficiencies. One example was a variety of peas which could not be boiled due to too much calcium carbonate in the soil. He said that even after a 24 hour period of boiling, the peas were still "hard as rocks." After balancing the mineral content of the soil in that locality, he said, the peas would cook normally.

A plea for a world court with authority to apprehend, judge and punish individuals for crimes against the laws of a world community, was made by Dr. Robert Lee Humber, Greenville, N. C. Dr. Humber, a world traveler and scholar in international relations, said that the old conception of diplomacy as a means to peace is impossible now, and that in its place there must be an international law which is enforceable in court rather than on a battlefield. He pointed out that diplomacy cannot recognize the responsibility of an individual, but in condemning an action by a foreign power, takes the attitude that the entire nation is at fault rather than the relatively few persons involved in warlike activities. He said that this principle of condemning only the individual guilty of a crime is accepted in local, state and national scales, but thus far, not on international levels. The abolishment of slavery, witchcraft and dueling should be but a prelude to the doing away with war, he declared, pointing out that civilization cannot survive a modern war in which all the present terrifying weapons for destruction will be employed.

High Analysis Panel

DISCUSSING the merits of high and low analysis fertilizer materials, a panel of five experts looked at the matter from different angles.

Top photo: Sidney Wald and Dr. Malcolm McVickar, both of NFA, look over picture of Public Relations award presented the Association in Washington. Second photo: Mr. & Mrs. H. C. Lawless, Kraft Bag Co.; Charles Mittleman, Kraft Bag; and Mr. & Mrs. J. S. Bannon, Bannon Bag Co.

Third photo: Travis S. Whitsel, T. E. Bradley, Mrs. Whitsel, and Weller Noble.

Fourth: Part of the line of conventioneers helping themselves to the barbeque feast given by the fertilizer manufacturers of Mississippi. (That's a big cake in center).

Below: (L to R): J. E. Totman, NFA board chairman; Dr. Russell Coleman, NFA president; L. G. Porter, U.S.D.A., Washington; and Fred Lodge, of the NFA staff, Washington.

Under the chairmanship of Dr. J. F. Fudge, College Station, Texas, the panel was composed of Maurice H. Lockwood, vice-president, International Minerals & Chemical Corp., Chicago, Ill.; A. F. Miller, Swift & Co. Plant Food Division, Chicago; Ivan E. Miles, extension agronomist, State College, Mississippi; and H. L. Dunton, head of the agronomy department of Virginia Polytechnic Institute, Blacksburg, Va.

Following an introductory explanation by chairman Fudge on what the panel was to do, Dr. Miles opened the discussion with a group of charts and graphs on the screen, to show the statistical trend in fertilizer grades. He said that the 2-12-6 was the most popular grade, comprising more than 14 percent of all fertilizers. He pointed out how the trend toward more plant food has increased over the years, from an average of 13½% plant food in 1880, to some 22% in 1949. Speaking for his state of Mississippi, he said that consumption of fertilizer there had increased some 300% in the past decade.

He pointed out that the southeastern states could probably get along with fewer grades of fertilizers, suggesting that if perhaps fifteen of the most popular grades were selected, these would probably be a sufficient number. He said that the southeastern states have nearly 700 grades at the present time.

Mr. Lockwood referred to a number of arguments favoring the use of high-analysis fertilizers from both a manufacturing and use standpoint. He pointed out that the past ten years have seen great increases in use of nitrogen, with the development of ammonium nitrate and nitrogen solutions being of particular significance. Superphosphate is manufactured in concentrations as high as 50%, he reported, although the average is considerably below this figure, of course.

The speaker showed how use of organic material in fertilizers has fallen off in the past few years. Whereas early in the century a large percentage of fertilizers were based on organic materials, the trend now is to use such in feed manufacture which brings a better price. The inorganics at the same time, have been more available and lower in price.

The increase in transportation rates was cited by Mr. Lockwood as another factor in favor of higher analysis fertilizers. Freight rates in the southeast and midwest have increased by 70%, he reported, and in New England the increase has been 77%. The introduction of more concentrated fertilizers would reduce this added expense by a considerable degree. The same principle would hold true in offsetting the high cost of labor which has risen nearly 100% in the industry during the past few years. This factor, plus the fact that man-hour output has declined, makes the introduction of more and more labor-saving machinery a necessity.

Since in most cases, the farmer uses too little quantities of fertilizer for best results, the high-analysis material would help to correct this condition because more plant food would be likely to reach the soil with the farmer applying it on a pounds-per-acre basis, Mr. Lockwood concluded.

Dr. Miller, in pointing out some of the factors against high analysis materials, said that the manufacturer faces a number of problems when he considers the production of this type of material. In a grade like 8-16-16 for instance, he said, the difficulty of keeping the material in good mechanical condition is acute because of moisture absorption and the fact that there is so little room for conditioners.

Manufacturers in the south, particularly, would suffer hardship in attempting to change over to high analysis production, he pointed out. Thousands of dollars would have to be invested in machinery for grinding or granulation, since high analysis grades must be physically suitable.

Aside from the production problems, he said, the task of gaining consumer acceptance is another important obstacle. Farmers purchase fertilizer by the bag, and in many cases they would resist buying a smaller amount of fertilizer for the same price, even though the plant food content might be superior. Furthermore, the farmer would find it difficult to apply, and he would find that it will not stand up well in storage. Education, especially through dealers, is of extreme importance, he declared.

Despite the factors disfavoring high analysis materials, he concluded that the idea is economically sound, and is a move in the right direction.

Dr. Dunton emphasized mass salesmanship as the best means to encourage consumer acceptance of high analysis fertilizers. He said that the rules of salesmanship for any desirable practice are applicable here. First, however, one must determine whether high analysis fertilizers are desirable and economically feasible in the area under consideration. Does it pay the farmer in dollars and cents, is a question which must be answered before proceding very far.

The introductory stage is particularly important, he said, since it should involve the close cooperation of the manufacturing industry, the state experiment station people and the farmer. He pointed out the parallel between "selling" high analysis fertilizer with that of promoting the pasture program in certain areas, stating that demonstrations, thousands of them, have proved to be most impressive and successful.

Timing of mass participation is of particular importance, he said, since being too early is futile, as is being too late. Much work and planning are essential to determine when maximum demonstrations would do the most good. As an incentive toward securing the cooperation of groups and individuals, they must have something definite to do, and must also be given recognition for their accomplishments. He said that seedsmen in his area are becoming enthusiastic salesmen for the cause, since yields are better and the seed dealers get part of the credit.

In a brief question-and-answer session following the panel's formal discussion, Mr. Dunton was asked what the manufacturer can do to promote the use of high-analysis fertilizer. He said that the maker must be thoroughly sold on it himself, then he should emphasize the plant food

(*Turn to Page 97*)

Agricultural DILUENTS

by
Roy E. Miller
President, Miller Products Company
Portland, Oregon

Part II

Compatibility

TO be usable, agricultural diluents must be compatible with the active ingredient materials, from a chemical as well as from a physical standpoint. Some diluents are neutral or inert; some accelerate the killing power; some decrease it.

Many factors have been noted regarding diluents that make them unsatisfactory to use with certain active ingredients. These include:

1. **Excessive moisture**
2. **Excessive alkalinity or acidity**
3. **Excessive amounts of impurities, such as colloidal particles of ferrous or ferric iron compounds**
4. **Excessive absorbing power**
5. **Excessive fine particle size**
6. **Excessive abrasiveness**

The disastrous effect of free moisture in the diluent causes rapid deterioration of tetraethyl pyrophosphate in dusts. Excessive alkalinity in the presence of moisture accelerates the breakdown not only of rotenone but also of parathion, chlordane, and tetraethyl pyrophosphate.

Some talcs are not suitable for use in making rotenone dusts because of the presence of excessive amount of impurities such as free ferrous or ferric iron or chloritoid minerals, especially those rich in ferrous iron. These iron impurities, according to Wilson and Jackson (1946), represent the chief source of colloidal particles in the diluents. Small particles, especially those of colloidal size, inhibit the toxic value of rotenone dusts. Talc is a good dispersant for rotenone when few colloidal particles are present. The talc should be free from excessive amounts of iron.

Heat is created when grinding DDT with certain diatomite diluents containing ferrous iron impurities. Under these conditions, a partial breakdown of DDT occurs in which one of the chlorine atoms is liberated in the form of HCl. The resulting decomposition product has little or no insecticidal value. This catalytic action of ferrous iron with DDT, on heating, has been noted by Fleck and Heller (1944). It was also shown by Flenner (1946), that on heating DDT in the presence of ferrous iron, this catalytic action was more rapid with purified samples of DDT than with technical or commercial samples of DDT. The too rapid loss of the residual insecticidal efficiency of DDT is one of the problems of the day.

Clays, in general, are not satisfactory for use in dusts with dinitro compounds, nicotine, or rotenone. Certain pyrophyllites are excellent diluents except for their abrasiveness due to the quartz particles that they contain. The U. S. Bureau of Mines has developed a simple flotation method for removal of free quartz particles from pyrophyllite.

Agricultural diluents play an important role in delaying or decreasing the rate of breakdown or decomposition of certain active ingredient materials. The exact extent of the contribution of the dispersant to this slowdown of decomposition or delayed loss of killing power is not always too well understood.

Robinson and Hatch (1944), experimenting with rotenone dusts, state that direct sunlight was the causative factor of decomposition. Direct sunlight is undoubtedly a vital factor in decreasing or destroying the killing power of many types of dusts and sprays. They also noted that the addition of 5% soybean oil or herring oil caused a notable deterioration of rotenone dusts in storage. The addition of 5% petroleum oil was without effect. Wilson and Janes (1942) noted that mineral oils were more satisfactory than vegetable oils where rotenone dusts were stored before use.

The selection or modification of agricultural diluents to accentuate killing power, stabilize effectiveness, delay or prevent rapid deterioration or decomposition, opens a vast field for investigation. Successful selection or modification of agricultural diluents would mean dusts and sprays effective over a longer period of time and more economical crop production.

Adhesiveness

WILSON and Janes (1942) state tenacity may be a factor in the superior performance of some diluents. A wide variation exists in the ability of different types of agricultural diluents to stick to foliage or fruit. Not only does this wide variation exist in different types of dispersants, but there is a similar variation in the sticking quality of different samples of the *same* type of agricultural diluent.

A large per cent of finished dusts applied in the field is frequently lost due to poor sticking or adhesive qualities. That part of the dust that sticks initially during application may weather away or be washed away rapidly. Robinson and Hatch (1944) found in orchard tests on dusts, mechanical losses during the first 24 hours varied between 15% and 90% of the amount found immediately after application because of wind, rain, and rubbing of leaves.

High killing power dusts may fail due to insufficient dust sticking or adhering to the foliage or fruit. Maintained or extended control may be lost because of the inability of the spray or dust to stick and weather well. One-third or less the amount of dust generally used might well give the same or better control providing its sticking and staying powers were improved.

Many agricultural diluents with high or desirable sticking qualities cannot be used effectively with certain active ingredient materials. (Janes and Wilson (1944). Some fine particle diluents with high sticking quality tend to form dust particle groups or agglomerates with poor adhesive qualities—Potts (1946).

Hervey and Pearce (1942) found that sprays showed more adhesive powers than lime, clay, talc, or "pyrax" dusts. The addition of soybean oil raised the adhesive properties of a "Pyrax"-lead arsenate dust which had high weather resistance.

Flint and Farrer (1932) state that mineral oils, 80 to 110 second viscosity, are the most desirable for dusting mixtures. Oil-treated dusts stick better than the same dusts without mineral oil. Increased sticking power with the addition of vegetable oils to dusts has also been noted by Gray and Shuh (1940); Bronson and Dudley (1940).

Fajans and Martin (1937) studied the physical properties of spray deposits which modified the efficiency of protective insecticides and fungicides. They found tenacity was greater on surfaces which wetted with difficulty. The addition of supplements which were highly surface active caused decreased tenacity.

Smith (1928) found that a spotty, coarse coverage was more desirable in codling moth control than a less concentrated film protection.

The addition of excessive diluent or of a supplement that is highly surface active may reduce the protective film of the active insecticide to a point where it will not give satisfactory pest control.

Woodruff and Turner (1949) found that when large amounts of wetting agents were added to DDT, the water suspension deposits were less as the concentration of the wetting agent was increased. These deposits washed off rapidly and caused a loss both in toxicity and tenacity.

Specificity

AGRICULTURAL diluents in general may be classified into related groups because of related characteristics. However, each diluent, due to its variation in both physical and chemical properties, as well as impurities, exhibits a specificity itself. Because of these facts, Wilson et al (1944) stated that the *dispersion characteristics* of finely ground nonmetallic minerals had some relationship to the per cent of pea aphid control.

Wilson and Janes (1942) examined thirty seven samples of agricultural diluents as dispersants for rotenone. Five samples of talc classified as superior; six were fair and the remainder were poor. One sample of pyrophyllite classified as superior; one was fair and one very poor. One calcium carbonate sample was found to be very good but the other calcium carbonate samples were undesirable.

Wilson and Janes (1942) also found there was considerable variation between different lots of diluent materials from the same mine, and the material produced and sold one year may be better or poorer than that sold the year before.

There will always be a growing demand and market for uniform, dependable agricultural diluents of proven effectiveness.

Particle Shape

THERE seems to be a correlation between the physical nature of particles of a dispersant and its value as a diluent in certain insecticidal dusts. Campau and Wilson (1944) state that the most important factors in diluents for rotenone seem to be closely related to *particle* shape, size and hardness. Wilson and Janes (1942) report that it is not clearly understood yet why some diluents are effective and some are not. *Particle shape* and chemical composition seem to be of great importance. Wilson et al (1941) reported fibrous talcs were less effective as diluents than flaky talcs for rotenone dusts.

Turner (1943) found that fibrous talc and clay were less effective than pyrophyllite as a diluent for rotenone. One gram of rotenone with pyrophyllite produced 8 times the effect of the same amount of rotenone used with fibrous talc or clay. Janes and Wilson (1944) reported all talcs of a fibrous nature were found to be poor dispersants for rotenone.

Toxicity

AGRICULTURAL diluents are usually spoken of as "inerts," meaning they have no killing power—insecticidal or fungicidal. While it is true that many diluents are in reality inert and have no killing power, there are other diluents, when used under certain conditions, that add to or detract from the effectiveness of the finished spray or dust product. They may nullify the end result sought, i. e., the control of agricultural pests.

How "Inerts" Kill

THE killing power that certain agricultural diluents possess was said to be physical rather than chemical by Germar (1936). Hunt (1947).

These so-called "inert" dusts are lethal in effect since they may bring about death or they may incapacitate insects in one of the following ways:

Starvation—(Flanders 1941) through the mechanical barrier to food supply—Driggers (1929); through a clogging of the digestive system—Richardson and Glover (1932) and Boyce (1933); a stoppage of movement of legs and mouth parts—Germar (1936); or through irritation—(Wheeler (1913); Germar (1936); Chiu 1939).

Dessication of Insect—Flanders (1941) and Hunt (1947), which may be achieved by humidities below 70%—Wilson and Janes (1942); Chiu (1939); aridity of environment—adhesiveness and fineness of dust—Zacher and Kunike (1930); Chiu (1939); Hunt (1947); modifying permeability of cuticle—Hockenyos (1939); Flint and McCauley (1939).

Abrasion — Wigglesworth (1945); Hunt (1947) exposing permeable intersegmental membranes—Germar (1936) increased penetration of toxicant—Hunt (1947)

Modifying internal environment of insect—Marshall (1939) Buffer reactions of diluents—Goodwin et al (1941-42); Hervey and Pearce (1942) Hunt (1947) tested 61 agricultural diluents and found that none of the botanical flours tested showed any toxicity or killing power. He agreed with Briscoe (1943) that there is a wide variation in the toxicity of non - metallic dispersants. Boyce (1932); Chiu (1939); Parfenjev (1929).

Fitzgerald (1944) states 200 mesh and finer silica, magnesite, dolomite, limonite, limestone and hydrated lime retarded weevil development in grain. Different samples of the same type of dispersant often varied greatly in effectiveness.

Wilson (1943) noted that Magnesite or Dolomite dusts applied to the mound surface of stored grain reduced insect infestations. Plank (1946) treated partially dried seed corn ears with hydrated lime and thus retarded the infestation of rice weevil. Chiu (1939) tested six agricultural diluents for control of bean weevil. The order of effectiveness was bentonite — magnesium carbonate — crystalline silica—amorphous silica—talc —walnut shell flour. Walnut shell flour showed no insecticidal value. Carrying on the same type of tests for control of the rice weevil and granary weevil, Chiu (1939) found walnut shell flour, talc, and bentonite had *no* practical insecticidal value for these pests. Crystalline silica and magnesium carbonate were more effective than amorphous silica.

An agricultural diluent under certain condition, may act as a *repellant*, and thus help to protect the treated crop. Woglum and Lewis (1940) found that a zinc-lime whitewash used to prevent sunburn on citrus trees was a successful repellent against the potato leafhopper on citrus. McDaniel (1937) noted the potato leafhopper was repelled on dahlias, potatoes, and alfalfa. The best control was obtained with lime, second with talc and the poorest control with flour.

Some agricultural diluents or the presence of excessive dust may reduce or nullify the insecticidal power of certain active ingredient chemicals. Hervey and Pearce (1942) found the addition of lime to lead arsenate sprays or dusts reduced the control of insects in comparison with lead arsenate alone. Walker and Anderson (1939), experimenting with rotenone dusts for control of pea aphis, found that clay used as a diluent gave the poorest control. Turner (1943) reports that it required four times as much rotenone to kill pea aphids with clay used as a diluent as it did when pyrophyllite was used. Campau and Wilson (1944) stated that certain clays nullified almost completely the toxic values of rotenone, regardless of concentration. "Pyrax" and "Frianite" were the only two materials which gave consistently good results. Holloway et al (1942) found a population increase of citrus red mite associated with the use of sprays containing *inert* granular residues. Callenbach (1940) reported excessive codling moth injury in areas bordering dusty highways and orchard rows. Holloway et al (1942) found the same results for citrus red mite. Melvin (1948) found that inert diluents or dusts decreased the efficiency of tetraethyl pyrophosphate sprays. Gaines and Hanna (1948) stated that inert diluents had no effect on the toxicity of dust mixtures of DDT, BHC or toxaphene and calcium arsenate to the cotton bollworm.

The killing, adhesive, and weathering qualities of some dusts have been improved through the addition of certain oils, wetting agents, or other modifying materials.

Electrostatic Charge

MOST diluents when blown through a dust applicator develop an electrostatic charge according to Wilson, et al (1944). This varied from 0 to 10,000 volts, the measuring capacity of their testing apparatus. Some diluent materials, such as fibrous talc, developed a low electrostatic charge, and these were inferior when used with rotenone for pea aphid control compared to flaky talc diluents which produced a higher electrostatic charge. As a general rule, diluents that develop a low electrostatic charge when blown through a dust applicator are inferior to those that develop high charges, Wilson, et al (1941).

It was pointed out by Wilson, et al (1944) that the degree of electrostatic charge appeared to have some relation to the dispersion of the dusts to all parts of the plants and this, in turn, seemed to affect the degree of aphid control. If a relatively high charge was produced, the dispersion of finely divided particles on stems and the underleaf surface was greatly increased. If little or no charge was produced, the dust particles tended to aggregate and did not give a fine dispersion on the underleaf surface.

Amount Used

IN some cases, we find the active ingredient itself has high sticking or weather resisting qualities, and in this case, the smaller the amount of diluent or wetting agent used, the better are the results. Woodruff and Turner (1949) found the small amount of diluent present in the concentrated DDT powders has enabled the toxicant to produce quick kill and maintain high mortality despite heavy washing.

Turner and Woodruff (1948) also noted that the mortality to house flies was greater when the same amount of DDT was applied to smaller areas. In other words, a heavier deposit concentrated on a small area was more effective than the same amount of toxicant spread over an area twelve times as large.

Gray and Schuh (1937) found no advantage in applying a cheaper, low-testing dust at a heavier rate per acre (120 lbs.) because of more thorough coverage, but rather it was desirable to apply the *equivalent* amount of insecticide in a concentrated dust (60 lbs. per acre). Using twice the amount of diluent to give better coverage was of no value in this case. Smith (1928) found that spotty, coarse coverage was more desirable in codling moth control than a less concentrated film protection.

Something new is the conception of using minimum amounts of diluents or carriers for the application of herbicides by airplane. In place of water, diesel oil is used and the application of as little as two quarts of diesel oil plus 2,4-D per acre has been successful in the control of numerous weeds in grain. One gallon, total mixture per acre, is now common practice with excellent weed control and a minimum of grain damage. In this case the diluent, diesel oil, accelerates the action of the 2,4-D.

Mixing

IN a dust, the actual weight of the active ingredient applied per unit of leaf surface is extremely minute. The weight of toxin (active ingredient) may be as little as one millionth of an ounce per square inch of leaf surface, Dorris (1944). This means that if the active ingredient is not distributed uniformly throughout the diluent, some parts of the plant will receive nothing but diluent. If the active ingredient remains in aggregates it will most likely fail to stick to the plant and fall to the ground, thus again leaving only the diluent.

The recognition of intimate blending is highly essential to uniform application in the field. The dust mixture should be so smooth that when a spatula is smoothed over the dust, or if a sample is pressed in a folded paper, no streaks or unmixed particles of active ingredients are visible.

Summary

AGRICULTURAL Diluents may increase, decrease, or nullify the toxicity or killing power of certain active ingredient chemicals—insecticides, fungicides, herbicides.

Botanical flours have little or no toxic or insecticidal value. There is a wide variation in the toxic or killing power of non-metallic diluents, not only between various types but even among individual diluents of the same type.

Numerous factors influence or modify the effectiveness of agricultural diluents such as: particle size; density; fluidity; moisture; pH value; absorbing power; compatibility (chemical and physical); adhesiveness; specificity; particle shape; toxicity; electrostatic charge; mixing; amount used.

Continued research is essential on non-metallic agricultural diluents, especially considering the numerous new organic chemicals appearing on the agricultural horizon.

Literature Cited

ALLEN, T. C. and J. W. BROOKS, 1940. The Effect of Alkaline Dust Diluents on Toxicity of Rotenone Bearing Roots as Shown by Tests with Houseflies. *Jour. Agr. Res.* 60:839-45.

BOYCE, A. M., 1932. Mortality of Rhagoletis Completa Cress Through the Ingestion of certain Solid Materials. *Jour. Econ. Ent.* 25:1093-9.

BOYCE, A. M., 1933. Control of the Walnut Husk Fly. *Jour. Econ. Ent.* 26:819-25.

BRISCOE, H. V. A., 1943. Some New Properties of Inorganic Dusts. *Jour. Roy. Soc. Arts* 91:593-607.

BRONSON, T. E. and J. E. DUDLEY, JR., 1940. Peanut Oil in Derris Dust Mixtures Against the Pea Aphid. *Jour. Econ. Ent.* 33:736-8.

CALLENBACH, J. A., 1940. Influence of Road Dust Upon Codling Moth Control. *Jour Econ. Ent.* 33:803-7.

CAMPAU, E. J. and H. F. WILSON, 1944. Dispersants for Rotenone. *Soap* (10) 20:117-21.

CHIU, S. F., 1939. Toxicity Studies of So-Called "Inert" Materials with the Bean Weevil. *Jour. Econ. Ent.* 32:240-88.

CHIU, S. F., 1939. Toxicity Studies of So-Called "Inert" Materials with the Rice Weevil and Granary Weevil. *Jour. Econ. Ent.* 32:810-21.

DAKE, H. C., F. L. FLEENER and B. H. WILSON, 1938. *Quartz Family Minerals.* McGraw-Hill Book Co., New York, N. Y.

DANA, E. S., 1932. *A Textbook of Mineralogy.* Fourth Edition, Revised and Englarged by W. E. Ford. John Wiley and Sons, Inc., New York, N. Y.

DORRIS, T. B., 1944. Intimate Blending of Dust Insecticides. *Soap* (11) 20:111.

DRIGGERS, B. F., 1929. Experiments with Talc and Other Dusts used Against Recently Hatched Larvae of the Oriental and Codling Moths. *Jour. Econ. Ent.* 22:327-34.

FAJANS, E. and H. MARTIN, 1937. The Effects of Spray Supplements on the Retention and Tenacity of Protective Deposits. *Jour. Pomol. & Hort. Sci.* 15:1-24.

FLANDERS, S. E., 1941. Dust as an Inhibiting Factor in the Reproduction of Insects. *Jour. Econ. Ent.* 34:470-1.

FLECK, E. E. and H. L. HALLER, 1944. Catalytic Decomposition of DDT. *Jour. Am. Chemical Soc.* 66:2095.

FLENNER, A. L., 1946. Catalytic Decomposition of DDT. *Jour. Am. Chem. Soc.* 68:2399.

FLINT, W. P. and M. D. FARRAR, 1932. The use of Mineral Oil for Better Dusts. *Jour. Econ. Ent.* 25:269-70.

GAINES J. C. and R. L. HANNA, 1948. Comparisons of Diluents in Insecticide Mixtures for Cotton Insect Control. *Jour. Econ. Ent.* 41:811-2.

GERMAR, B., 1936. Versuche zur Bekämpfung des Kornkäfers mit Staubmitteln. *Z. Angew Ent.* 22:603-30.

GOODHUE, L. D., 1938. The Particle Size of Commercial Insecticidal Sulfurs as Determined by Sedimentation analysis. *Jour. Econ. Ent.* 31:410-4.

GOODWIN, M. W., S. L. HOPPERSTEAD and K. J. KADOW, 1942. Compatibility of Diluent Dusting Materials with Copper Fungicides with and without Calcium Arsenate *Phytopath.* 32:6.

GOODWIN, M. W., S. L. HOPPERSTEAD and K. J. KADOW, 1944. Insecticide Diluents. *Soap* (8) 20:103-7.

GOODWIN, M. W., K. J. KADOW and D. F. MURPHY, 1941. Compatibility of various "Inert" Ingredients with Cuprous Oxide and Calcium Arsenate. *Phytopath.* 31:8.

GRAY, K. W. and J. SHUH, 1940. Pea Aphid Control Experiments in Oregon. *Jour. Econ. Ent.* 33:72-7.

HERVEY, G. E. R. and G. W. PEARCE, 1942. The Influence of Lime on the Toxicity of Lead Arsenate to Cabbage Worms. *Journ. Econ. Ent.* 35:554-8.

HOCKENYOS, G. L., 1933. Effect of Dusts on the Oriental Roach. *Jour. Econ. Ent.* 26:792-4.

HOCKENYOS, G. L., 1939. Factors Influencing the Absorption of Sodium Fluoride by the American Cockroach. *Jour. Econ. Ent.* 32:843-8.

HOLLOWAY, J. K., C. F. HENDERSON and H. V. McBURNIE, 1942. Population Increase of Citrus Red Mite Associated with the use of Sprays Con-

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W. W. Worzella
N.C.W.C.C. President

North Central Weed Control Conference discusses new

Herbicide Problems

WITH headquarters at the Schroeder Hotel, Milwaukee, Wisconsin, the North Central Weed Control Conference was to hold its 7th annual meeting December 12, 13 & 14. The advance program called for sessions covering the responsibility of the seller of herbicides; new application equipment; new weed control chemicals; enforcement of state weed laws; aerial spraying of herbicides; extension activities; plant physiology and a panel discussion on plans for a sound regulatory program.

Chairmen of the various sessions were to include NCWCC president, W. W. Worzella, chairman of the department of agronomy, South Dakota State college, Brookings; T. F. Yost, Dept. of Agriculture, Topeka, Kans.; G. F. Warren; R. L. Brandenburger; Charles J. Gilbert; Walter F. Ball, Dept. of Agriculture, State of California, Sacramento; Frank Trumbauer; E. P. Sylwester, Iowa State College, Ames; R. S. Dunham, University of Minnesota; F. J. Greaney, Winnipeg, Canada; R. A. Norton; W. E. Loomis; W. C. Dutton; H. E. Wood, Commissioner of Weeds, Manitoba Dept. of Agriculture, Winnipeg; and L. W. Melander.

Guest speakers named on the program included Dr. F. W. Went, California Institute of Technology, Pasadena, and the Hon. J. G. Gardiner, Minister of Agriculture, Ottawa, Canada. The banquet was scheduled for Wednesday evening.

Dr. F. W. Went
Talks on "Role of Environment in Weed Growth," as guest speaker on opening morning of the convention.

Rt. Hon J. G. Gardiner
"Our Common Heritage"

Dr. K. P. Buchholtz
Chm., NCWCC Research Committee

Charles J. Gilbert
Regulatory Committee Chairman

Dr. W. E. Domingo
"Castor Beans—New Cash Crop"

Greater Production Emphasized at 26th Annual Meeting of Calif. Fertilizer Ass'n

ONE of the most successful meetings in the group's 26-year history was held November 2-4 by the California Fertilizer Association at the Hotel del Coronado, San Diego. Attending the convention were representatives of ten states and the Dominion of Canada, in addition to those from California. Registration totaled 290.

Dr. Paul F. Sharp, director of the Experiment Station of the University of California reviewed the profound changes in American industry during the past century, noting particularly the factors which have enabled the American people to eat more from food grown on less and less land. He pointed out the transition from "muscle power" to mechanical energy on the farm, makes it possible to produce more food on fewer acres, and that this falling-off of muscle usage reflects in lower intake of calories by the average person.

A hundred years ago, he said, 6% of the energy used in the U. S. was mechanical. Today, it is 91%. Horses and mules contributed 79% of the energy used then, compared to 5% now. A century ago, 15% of energy expended was human, now it is 4%. This has combined to make possible the release of greater numbers of farm workers for industrial production, he said.

Tasks remaining directly before us are four-fold, he said. First, we must learn to take better care of the land; second, learn how to produce larger crops, third, learn how to take better care of crops, and finally, learn how to produce food of higher nutrition.

Following Dr. Sharp, and continuing the theme of "Service through

J. H. Nelson
Observes Fertilizer Use

Research," Dr. Vincent Sauchelli, Davison Chemical Co., Baltimore, Md. described research as being a state of mind willing to acknowledge that not all is known about fertilizers, plant nutrition and biological processes, and to take steps to find out more. That research is not incidental to business but rather a basic need, was emphasized by Dr. Sauchelli. He declared that industry is obliged to get fresh growth or to perish. The way modern business revives itself is to discover and breed new business,

Dr. O. A. Lorenz
"Placement of Fertilizers"

Quinn Re-elected

CFA re-elected J. M. Quinn, California Sun Fertilizer Co., Los Angeles, as president at the San Diego meeting. Jack Baker, Bandini Fertilizer Co., Los Angeles, was named vice-president to succeed Paul Pauly, Pacific Guano Co., while Wm. Snyder, Wilbur-Ellis Co., was elected to succeed Grover Dunford, Inland Fertilizer Co., who resigned.

Three new directors were elected to serve for three-year terms. They are: Lowell Berry, Best Fertilizers Co., Oakland, (re-elected); B. H. Jones, president, Sunland Industries, Fresno; and S. B. Tatem, Swift & Co., Los Angeles.

(See Pg. 82 A for Photo of Officers and Directors)

improve the old, develop new products and create new outlets. "That is the scientific approach," he declared, and added that industry should work closely with all agencies serving agriculture. "By intergrating our activities with theirs we can better achieve a prosperous progressive agri-

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AAEE

MEMBERS of the American Association of Economic Entomologists and the Entomological Society of America were preparing early this month for what may be the final joint meeting of the two groups, to be held at Denver, Colo., December 18-21. An important topic to be discussed further at this year's meeting is the possible consolidaton of the two groups. A letter ballot early in 1951 is expected to determine what the future course of the two organizations will be.

The program for the AAEE meeting was rapidly reaching completion under the charge of the committee headed by L. D. Christenson, Fruit Insect Investigations, B. E. P. Q., U.S.D.A., Washington, D. C., who released the following details:

The address of the President, "The Time Factor in Biological Control," will be given by C. P. Clausen, Chief of the Divisions of Control Investigations and Foreign Parasite Introduction, Bureau of Entomology and Plant Quarantine, Washington, D.C., at 10:00 a.m., December 18.

The meeting of the Section of Plant Pest Control and Quarantine will feature a number of invitational addresses on subjects of current interest. Dr. H. M. Harris, State Entomologist of Iowa, will discuss "Plant Quarantine Problems Relating to the European Corn Borer;" Dr. G. Steiner of the Bureau of Plant Industry, Soils and Agricultural Engineering, will discuss "Cyst Forming Plant Nematode Pests and How They are Spread;" Claude Wakeland of the Bureau of Entomology and Plant Quarantine will discuss "Changing Problems and Procedures in Grasshopper and Mormon Cricket Control;" John H. Hughes of the U. S. Public Health Service will discuss "The Possibility of Introducing Insects through Air Traffic;" R. L. Furniss of the Bureau of Entomology and Plant Quarantine will discuss "Spruce Budworm Control in Oregon and Washington;" and S. B. Fracker of the Agricultural Research Administration, U. S. Department of Agriculture, will discuss "The Proposed International Plant Protection Convention."

In the meeting of the Section of Biological Control, Paul DeBach, University of California, Riverside, G. C. Ullyett, Commonwealth Bureau of Biological Control, Ottawa, Canada, J. T. Griffiths, Florida Citrus Experiment Station, and Walter E. Ripper, Pest Control, Ltd., Cambridge, England, will contribute to a Symposium on "The Compatibility of Insecticide Programs with Biological Control."

Invitational papers to be given at the meeting of the Section of Extension include "Functions of Regulatory and Extension Entomology" by T. L. Aamodt, Bureau of Plant Industry, Minneapolis, Minn.; "Demonstration of Combined Influence of Insecticide and Fertilizer on Alfalfa Seed Production" by E. H. Fisher of the University of Wisconsin, and "Mortality of Pollinators in Legume Insect Control" by George F. Knowlton of the Utah State Agricultural College. Topics which will come up for discussion and the designated discussion leaders are "Corn Borer Population in Relation to the 1950 Weather Conditions"—Wayne J. Colberg, North Dakota Agricultural College; "What is being Done in the Control of Stored Grain Insects"—J. O. Rowell, Virginia Polytechnic Institute; "Do We Still Have an Immune Fly Problem"—T. R. Robb, University of Wyoming, and "What's New in Cotton Insect Control"—Rudolph G. Strong, Louisiana State University. The Labeling of Insecticides will also be discussed at this session.

At the meeting of the Section of Medical Entomology, "The Expert Committee of Insecticides of the World Health Organization" will be the subject of a paper to be given by S. W. Simmons, U. S. Public Health Service. Lt. Commander J. M. Hirst of the U. S. Naval Station, Jacksonville, Florida, will discuss "Naval Automatic Disinsection of Aircraft;" W. V. King, Bureau of Entomology and Plant Quarantine, will discuss "The Newer Insecticides and Repellents Available Against Insects of Medical Importance;" Luis Vargas, Instituto Salubridad y Enfermedades Tropicales, Mexico, D. F., will present a paper on "The Importance of the *Anopheles pseudopunctipennis* complex in Malaria in the Americas," and Cornelius B. Philip, U. S. Public Health Service, will report on "Tick Transmission of Indian Tick Typhus and Some Related Rickettsioses." Submitted papers will round out the meeting of this Section.

At a Joint Session of the American Association of Economic Entomologists and the Entomological Society of America scheduled for 8:30 a.m., Tuesday, December 19, Cornelius B. Philip, Assistant Director of the Rocky Mountain Laboratory of the U. S. Public Health Service, Hamilton, Montana, will deliver the Invitational Public Address of the Entomological Society of America entitled "Tick Talk." This address will be followed by invitational addresses on subjects of current general interest as follows: "Recent Developments in Canadian Entomology," by Robert Glen, Chief, Division of Entomology, Dominion of Canada Department of Agriculture;

To Denver for annual meeting. Residue hearings to be reviewed

"Keeping up in a Changing Era," by Floyd Andre, Dean, Division of Agriculture, and Director, Agricultural Experiment Station and Extension Service, Iowa State College; "Some of the Fundamental Problems Characteristic of Large-scale Pest Control Projects," by W. L. Popham, Assistant Chief, Bureau of Entomology and Plant Quarantine.

Synopsis of the Program
(All Sessions in Cosmopolitan Hotel, Denver, Colorado)

MONDAY, DECEMBER 18

10:00-10:30 a.m.
Joint Session with Entomological Society of America. Address of the President, American Association of Economic Entomologists, Silver Glade Room.
10:30-12:00 a.m.
Preliminary Business Meeting. Silver Glade Room.
1:30-5:00 p.m.
Section of Plant Pest Control and Quarantine—Silver Glade Room.
1:30-5:00 p.m.
Section of Medical Entomology—Century Room.
1:30-5:00 p.m.
Section of Biological Control—Club Room.

Evening

7:30-10:30 p.m.
Section of Extension—Century Room.

TUESDAY, DECEMBER 19

8:30-12:00 a.m.
Joint Session with Entomological Society of America. Invitational Public Address, Entomological Society of America. Invitational papers on topics of general interest, Silver Glade Room.
1:30-5:00 p.m.
Submitted Papers on Insects Affecting Vegetables—Century Room.
1:30-5:00 p.m.
Submitted Papers on Medical Entomology—Silver Glade Room.
1:30-5:00 p.m.
Submitted Papers on Insects Affecting Cereal and Forage Crops—Club Room.
6:30-7:30 p.m.
Cocktail Party—Century Room.
7:30 p.m.
Entomological Banquet and Entertainment—Silver Glade Room.

WEDNESDAY, DECEMBER 20

8:30-12:00 a.m.
Section of Insecticides—Silver Glade Room.
8:30-12:00 a.m.
Submitted Papers on Biological Control—Century Room.
1:30-5:00 p.m.
Special Session: Bioassay of Insecticides, Silver Glade Room.
1:30-5:00 p.m.
Section of Teaching—Joint Session with *Entomological Society of America*, Century Room.
1:30-5:00 p.m.
Section of Apiculture—Club Room.

Evening

6:30-8:00 p.m.
Complimentary Banquet and Entertainment—Silver Glade Room.

THURSDAY, DECEMBER 21

9:00-10:00 a.m.
Final Business Meeting—Silver Glade Room.
10:00-12:00 a.m.
General Session: Submitted Papers on Insecticides, Century Room.
1:30-5:00 p.m.
Submitted Papers on Insects Affecting Forest and Shade Trees—Club Room.
1:30-5:00 p.m.
Submitted Papers on Insecticides—Century Room.
1:30-5:00 p.m.
Submitted Papers on Miscellaneous Subjects—Crystal Room.

Speakers Listed

WHILE complete program details are not available as yet for all sessions, the full list of speakers is given below for the Section On Insecticides, Wednesday morning and the Special Session on Bioassay of Insecticides, Wednesday afternoon.

WEDNESDAY MORNING
DECEMBER 20

8:30 a.m.
Section of Insecticides—Silver Glade Room. Chairman: Bruce D. Gleissner, American Cyanamid Co., Stamford, Connecticut. Secretary: D. F. Starr, S. B. Penick and Co., New York.

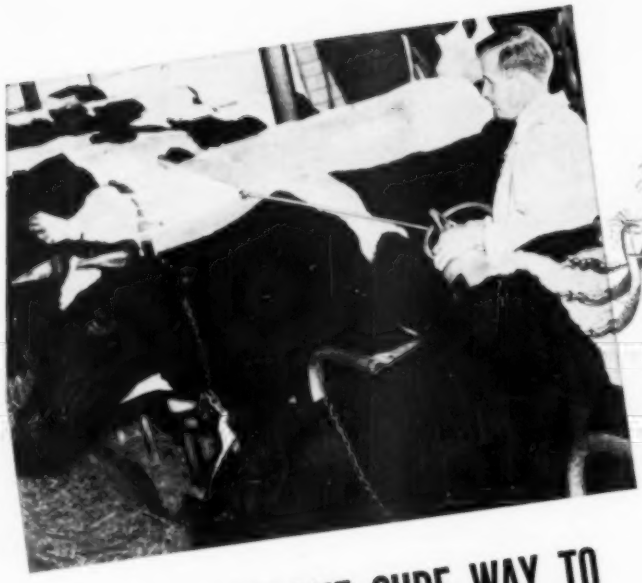
1. Criteria for Measuring Phytotoxicity of Insecticides and Their Mode of Action. J. E. Casida and T. C. Allen, Department of Economic Entomology, University of Wisconsin, Madison. (47).
2. The Environmental Health Aspects of Agricultural Pesticides. Dr. Frank Princi, Associate Professor of Industrial Medicine, University of Cincinnati, Cincinnati.
3. Review of the Residue Tolerance Hearing and a Discussion of the Mechanics of Preparing the Findings of Fact and Regulations and Some of the Problems that are involved. Bernard D. Levinson, Presiding Officer, Federal Security Agency, Washington, D. C.
4. Presentation of New Materials and Formulations. Business Meeting, Section of Insecticides.

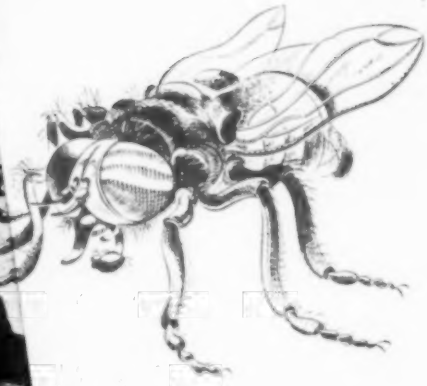
WEDNESDAY AFTERNOON
DECEMBER 20

1:30 p.m.
Special Session—Bioassay of Insecticides. Silver Glade Room. Designated Chairman: C. E. Palm, Cornell University, Ithaca, New York.

1. Some Principles for Bioassay of Insecticides. W. M. Hoskins, University of California, Berkeley. (59).
2. Biological Assay of Residues of DDT and Chlordane in Soil Using *Macrocentrus ancylivorus* Rohwer as a Test Insect. W. E. Fleming, L. W. Coles, and and W. W. Maines, Bureau of Entomology and Plant Quarantine, Moorestown, N. J. (60)
3. Microbioassay of Aldrin and Dieldrin in Experimental Animal Tissues. Paul A. Dahm, Department of Entomology, Kansas State College, Manhattan. (61)
4. Microbioassay of Insecticides. Y. P. Sun and J. Y. Tung Sun, Julius Hyman & Co., Denver. (62)
5. Problems in Using Mosquito Larvae for the Bioassay of Insecticidal Residues in Animal Products. R. C. Bushland, Bureau of Entomology and Plant Quarantine, Kerrville, Texas.
6. Bioassay of Organic Insecticides in Processed Foods. Albert Hartzell. Boyce Thompson Institute for Plant Research, Inc., Yonkers, New York. (63)
7. Bioassay of Cotton Dusts with the Adult Boll Weevil. John K. Reed and M. D. Farrar, Clemson of Agricultural College, Clemson, S. C.
8. The Bioassay of BHC and DDT Production Samples. N. F. Hardman and C. O. Persing, Stauffer Chemical, Agricultural Research Laboratory, Mountain View, Calif.
9. Techniques Used at the University of California Citrus Experiment Station for the Bioassay of New Insecticides. R. L. Metcalf, Division of Entomology, Citrus Experiment Station, Riverside, Calif.

Headquarters for the A.A.E.E. will be in the Cosmopolitan Hotel. The E.S.A. will make its headquarters at the Shirley-Savoy. Floyd Andre and H. G. Johnston are assisting Mr. Christenson with the work of the Program Committee. Local arrangements are in charge of a Denver committee consisting of Dr. George M. List, Claude Wakeland, James Dutton, W. E. McCauley and B. Thomas Snipes.





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*Registered U. S. Patent Office

Phosphate Fertilizers —

their manufacture from phosphate rock without use of sulfuric acid

By W. L. Hill

Bureau of Plant Industry, Soils & Agricultural Engineering
U.S.D.A.
Beltsville, Md.

IF perchance our sulfuric acid supply were completely cut off, about 90 percent of the phosphate fertilizer production, as it is known in the United States today, would be halted. This would be due to the preeminent position of ordinary superphosphate in phosphate fertilizer consumption and the prominence of wet-process phosphoric acid in the production of triple superphosphate and ammonium phosphate, both of which products are derived from sulfuric acid treatment of phosphate rock. Fortunately, there are several other methods for producing available phosphates, which do not require sulfuric acid. These processes, which have thus far found limited use in the domestic fertilizer industry, fall naturally into four groups—acid treatment, thermal defluorination processes, calcination with alkali salts, and fusion with magnesium silicate.

Acid Treatment

Phosphoric Acid.—Triple superphosphate is prepared (*13*) with the use of phosphoric acid produced by the electric furnace process (*12*). However, at the present time only one triple superphosphate plant in the United States is operated strictly on this basis; another uses spent acid (made by furnace process) from an industrial operation. Dicalcium phosphate and ammonium phosphate are now produced for fertilizer use in the United States by neutralization of furnace-process acid.

In the electric-furnace process the current practice is to produce elemental phosphorus, which is then oxidized in a second step to yield phosphoric acid of a high purity. Instead of admitting water to form H_3PO_4, the P_2O_5 vapor can be allowed to react directly with phosphate rock to produce calcium metaphosphate (*3*). The operating temperature is 1000 to 1100° C., and the product is vitreous. Formerly, some tirple superphosphate was manufactured with the use of phosphoric acid by the blast-furnace process (*4*). This furnace ceased operation several years ago, and the company now uses the electric-furnace process.

Hydrochloric Acid.—Dicalcium phosphate can be produced by treating phosphate rock with hydrochloric acid with subsequent neutralization with lime. Another method, recently proposed, is the chlorophosphate process (*5*).

Nitric Acid. Practical methods for producing fertilizer with the use of nitric acid treatment require neutralization of the acidulated product. The logical neutralizing agent is ammonia, and the product thereby obtained is a mixture of dicalcium

(*Turn to Page 86*)

Sulfur Shortage Grows Acute

SERIOUS shortages of sulfuric acid are the fertilizer industry's number one headache as 1951 begins. Tremendously increased uses for the acid, not only in the fertilizer trade, but in scores of other industries, plus an export program which may total 1,200,000 tons for 1950, has brought on the shortage. Briefly, the situation is this: demand for sulfur is about 6 million tons, while annual production at present is but 5.7 million tons, and there appears to be no simple way to increase the supply.

However, the four main U. S. producers, Texas Gulf Sulphur Co., which accounts for half of the U. S. output; Freeport Sulphur Co.; Du Val Sulphur & Potash Co.; and Jefferson Lake Sulphur Co. are trying to develop new sources of supply. In the meantime, Texas Gulf has cut shipments to customers by 20% and has just advanced price (at the mine) from $18 to $21 a ton. The other three companies increased their quotations by $4 per ton, but had not cut shipments late in November.

The possibility cannot be overlooked of course, that further price advances may follow, in a move to stimulate production from other than normal sources.

Many U. S. consumers are urging that exports be cut in order to ease the domestic shortage. Government officials, however, studying the situation with the view of reducing exports, have indicated that requests for a 50% cut are too drastic, but a reduction of perhaps half that amount might be considered.

Sulfuric acid in the manufacture of fertilizer is one of the major items of consumption, amounting to some 1,500,000 tons this year, more than half of the 1949 output of Texas Gulf Sulphur Co. Other industries, noting this large use, are submitting arguments to the effect that this total can be reduced substantially.

Efforts on the part of producers of sulfur to increase the supply have been widespread and thorough. Texas Gulf has spent $11 million in the past three years in an attempt to develop new sources. Its small dome, Moss Bluff, may double its output of 150,000 tons in 1951, and a new plant taking sulfur from petroleum gas is making 100,000 tons annually, it is reported. The company also hopes to get sulfur from Spindle Top, a new dome, at the rate of 250,000 tons by the end of 1951. Jefferson Lake expects to add 100,000 tons of output by the end of 1951 also, but these additions will not balance supply against heavy foreign and domestic demand.

As a commentary on this situation, the accompanying article by W. L. Hill suggest possible ways that the fertilizer industry might produce phosphate fertilizers without sulfuric acid.—Editor.

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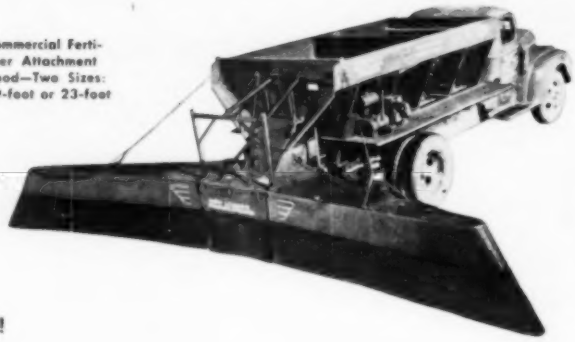

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Conveyor is separately driven from truck drive shaft by a series of V-belts to deliver the correct amount per acre—regardless of truck speed or regardless of whether the truck is driven in low, super-low or any other gear.

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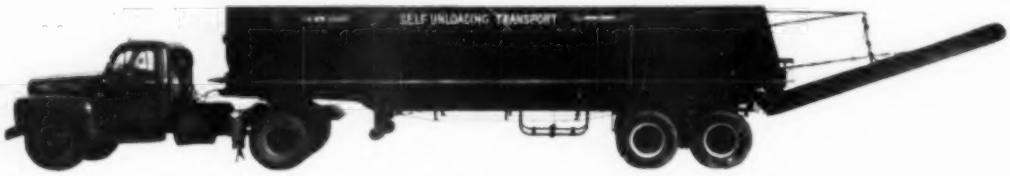
Spreader Body Lengths (inside measure) are 9′, 11′, 13′ and 15′. Other body lengths on special order.

Note: When Spreading Attachment is folded up for road-traveling position, width is approximately 7′-5″.



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MANUFACTURERS OF THE WORLD'S MOST COMPLETE LINE OF SPREADERS

"Little loss of business traceable to activities of organic group," say

Fertilizer Dealers

NUMEROUS letters have been received during the past month commenting on the article "Organic vs. Chemical Fertilizers" which appeared in the October issue of Agricultural Chemicals. In general the industry's comment is that while the followers of the organic theme in fertilizer application have been highly vocal in their claims, and have attracted considerable attention among agricultural faddists, few commercial users of fertilizers have taken the organic argument seriously. As one of our readers phrased it, "Most people who are interested (in the organic story) have never used fertilizer at all except possibly on their flowers."

"There are no appreciable numbers of commercial growers falling for the organic line to the extent of excluding chemical fertilizers," said a New England reader. "The main support for use of organics comes from 'city gardeners' of the back yard variety." There have been instances, however, where landlords, city dwellers, have demanded that tenant farmers working their land stop using all chemical fertilizers and confine their soil nutrition practices to compost and other organic matter. A specific case was cited by one reader where a dairyman was told by his landlord to stop using chemical fertilizers on a rented pasture.

Despite the highly vocal following which the organic group seems to have attracted, fertilizer dealers say they have experienced little loss of business they can trace to this cause. "I don't believe that the organic cult has cost us a single ton of fertilizer sales," reports one dealer, adding, "but it has been extremely annoying." He says that in his community, some socially prominent persons are "keeping their friends stirred up about it all the time.

The industry apparently takes the position that there is not too much to worry about in the publicity being given the organic thesis by the Rodale and other groups. "Given enough rope," said another reader of AGRICULTURAL CHEMICALS, "the organic group will eventually hang itself by its outlandish claims which cannot survive unbiased scientific investigation."

Instances were related by the score where the supporters of use of organics have held meetings in various localities to preach that commercial fertilizers "cause cancer, tuberculosis, hernia and a few other things," as one correspondent put it. In one community all of the health officers from surrounding towns, as well as all the doctors were invited to attend a lecture which was of course built around the theme of vibrant health through organics. Apparently the doctors must not have been favorably impressed, the letter says, for the speaker displayed an infinite capacity for error in both logic and his handling of scientific facts. As the writer declared, (the speaker) . . . "was either ignorant of, or completely scornful of the science of chemistry. He made . . . statements such as that if you put your hand in superphosphate it will burn you, and when it is applied to the soil, it is so full of acid that it burns out all the organic materials." The speaker is reported to have stated that 5-10-10 fertilizer is 80% sand and 20% plant food, and the latter is so soluble that when applied to the soil 90% of it is washed away and is carried to streams where it kills the fish, while the other ten percent sinks into the soil to form an inpenetrable layer of "washing soda" which makes the water run off.

Among all of the letters backing up the viewpoint of the fertilizer trade was one lone correspondent who observed that the statements of the organic group sound "very interesting and there may be something to it." The writer describes himself as a large grower of vegetables in Pennsylvania, and states that he expects next year to make some organic method tests as compared to the regular procedure of chemical fertilizers. The same experiment was undertaken during the past season, but rainy weather conditions upset the plan which had to be abandoned, he said.

This Pennsylvania writer indicates that more needs to be known about the relative merits of the two methods of farming. "I do not think that the chemical fertilizer industry should be too complaining about Mr. Rodale until some definite tests have been made to prove this an absolute failure or to provide more foundation for his beliefs," he declares. He goes on to comment that the leaders of the organic movement "seem to be very sincere" in what they are attempting to do.

Eastern Branch A.A.E.E. Meets

F. H. Lathrop new section chairman. Strip method of fly control described by Cornell worker. Existing regulations governing insecticide use called adequate

THE 22nd annual meeting of the eastern branch of the American Association of Economic Entomologists was held at the Warwick Hotel, Philadelphia, November 20 and 21. The group elected F. H. Lathrop of the Maine Agricultural Experiment Station as chairman of the branch for the coming year. Floyd Smith of the Truck Crop Insect Division B.E.P.Q., Beltsville, Maryland, was named vice chairman. B. F. Driggers of the New Jersey Agricultural Experiment Station, New Brunswick, New Jersey, continues as secretary-treasurer.

A paper of considerable interest to insecticide manufacturers delivered at the meeting was one by David Mentel of Cornell University entitled, "New Treatment Methods For House Fly Control in Dairy Barns." One hundred and seventeen dairy barns were treated during the 1950 season by three methods: spraying the entire barn; spot treatment; and using a new strip treatment method in which wire strips are sprayed outside the barn with concentrated insecticide solutions, then hung from the roof of the barn. (This, incidentally, was the first time the strip treatment method had been used in dairy barns.)

Of the various insecticides tested, dieldrin gave outstanding results, controlling flies throughout the fly season. There was also complete freedom from milk contamination. The strip treatment gave effective control for over 16 weeks. When the entire barn was sprayed, five week control was attained. The spot treatment gave effective control for over 16 weeks. When the entire barn was sprayed, five week control was attained. The spot treatment gave ten weeks control, being more effective than the over-all treatment, and with less chance of milk contamination, but not as satisfactory in either respect as the strip treatment. Another suggested advantage in the strip treatment is that there would seem to be less chance of resistance developing, since flies never contact a sub-lethal dose.

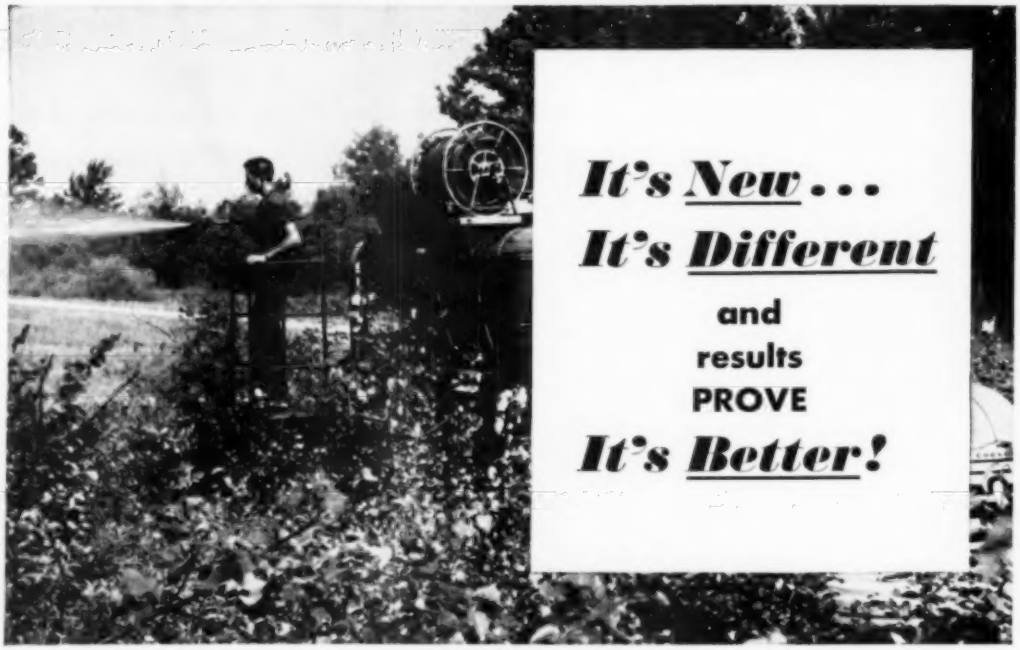
Philip Granett and Harry L. Haynes of Rutgers University, presented a paper, "Further Evaluation of Butoxy Poly Propylene Glycol as a Fly Repellent for Dairy Cattle." They reported on two years of testing with formulas containing butoxy poly propylene glycol alone and with pyrethrins; pyrethrins plus synergist allethrin and "Thanite" against horn, stable and house flies.

Combinations containing about five to ten percent butoxy poly propylene glycol 800 were found to be highly effective on the day of application in repelling flies. Protection generally dropped off the following day. Emulsions were reported to be as effective as oil base sprays.

Another paper by Philip Garnett and Carl F. French of Rutgers University reported on "Further Tests of Dibutyl Adipate as a Tick Repellent." At two grams of the chemical per square foot of cloth up to seven weeks effective protection was attained. (98% protection the seventh week). The product was tested on coveralls and proved to withstand some washing.

Aerosol application on trousers was also tried and resulted in up to three weeks protection with a five or fifteen percent aerosol applying approximately one gram of dibutyl adipate per square foot of cloth. n-Mandelate also gave effective control, but is apparently impractical for commercial application because of the toxicity problem.

At the Philadelphia meeting, L to R, front row: Dr. C. P. Clausen, U.S.D.A., Washington, D. C. president of the A.A.E.E.; F. H. Lathrop, Maine Agricultural Experiment Station, Orono, Newly-elected chairman of the Eastern Branch; and Edwin Gould, West Virginia Agricultural Experiment Station, Kearneysville, retiring chairman. Standing are Dr. B. F. Driggers, New Jersey Agricultural Experiment Station, New Brunswick, secretary-treasurer of the Branch; and Ernest N. Cory, College Park, Md., secretary-treasurer of of A.A.E.E. Floyd Smith, Truck Crop Insect Division of the B.E.P.Q., Beltsville, Md., newly-elected vice-chairman of the Branch, is not in photo.



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- It now contains the NEW, PATENTED LOW-VOLATILITY esters of 2,4-D and 2,4,5-T.
- It also contains a higher percentage of active ingredients—4 pounds acid equivalent per gallon.
- It has demonstrated increased effectiveness over a wide variety of woody growths.

Yes, Esteron Brush Killer packs a wallop! Easy and economical to use as a foliage spray, it gives good control of alder, ash, birch, brambles, cherry, elm, hickory, maple, oaks, osage orange, poison ivy, sumac, willow and other hard-to-kill species at lower cost. It is successful, also, in controlling resprouting of stumps when it is applied in oil immediately after cutting.

Dow will be glad to furnish you with a wealth of information on brush control on right-of-ways and farm lands. Dow sales and technical men are available for consultation and assistance. Your inquiries are invited.

Also recommended for woody plant control is Esteron 245. For controlling grasses such as Johnson, quack and Bermuda—use Dow Sodium TCA 90%. No fire hazard—and treated foliage presents no poison hazard to grazing cattle.

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Tests were also conducted to check on the efficiency of various combinations in protecting dogs from tick infestations. These experiments were rather unsatisfactory as no protection was attained beyond one to two days.

William E. Wagner of Geary Chemical Corp., New York, reported on "Preliminary Field Trials with "E-838," new phosphate insecticide (Diethoxy thiophosphoric ester of 7-methyl-4 hydroxy coumarin)." The product originated in Germany, being developed by Gerhard Schrader, the inventor of parathion. It is made there by Farbfabriken Bayer. Tests over the past season at Blue Point, L. I., have proved it to be particularly effective against beetles, of the coleoptera types. The best type formulation is said to be a 2% dust. It controls Mexican bean beetle for as long as one month after treatment. It is low in mammalian toxicity and residues are said to disappear about a week after insecticidal activity stops.

Peach Tree Borer

EDWARD H. Smith, New York State Agricultural Experiment Station, Geneva, N. Y., reported on studies on the control of the lesser peach tree borer. The customary series of three DDT sprays has proved to give very good control of the peach tree borer, but has not controlled the lesser peach tree borer. Thus growers have mistakenly reported that DDT sprays were ineffective against the first named pest which is sufficiently similar in appearance with the lesser borer to be confused with it. Smith's work indicated that substituting parathion for DDT, using four sprays instead of three, and starting the spray cycle three weeks earlier, resulted in satisfactory control of both borer types.

Neely Turner of the Connecticut Agricultural Experiment Station, New Haven, reported further on his work in cleaning up BHC contaminated soils with applications of activated carbon. Sucessful results were obtained at rates of 10, 50 and 100 lbs. per acre, depending on the severity of the contamination.

W. L. Howe of the New York State Agricultural Experiment Station at Geneva, N. Y., reported on the comparative efficiency of various insecticide-fungicide combination treatments for maggot control and seedling stand improvement, based on work which he and W. T. Schroeder have done over the past two seasons. Good control of the seed corn maggot on crops such as beans and lima beans was obtained by seed treatments, but it was early found desirable to include a fungicide with the insecticide for best performance. Of several fungicides tested, "Arasan" was found most satisfactory. And to obtain adequate distribution and retention of the mixtures on the smooth surfaces of the treated beans, it was found essential that the materials be suspended in a spreader-sticker solution. A 4% Methocel solution proved satisfactory.

Suggested materials and doses for treating one bushel of seed follow, listed in order of preference:

Insecticide	oz./bu.	Fungicide	oz./bu.	4% Methocel sol'n./bu.
Lindane (25% W.P.)	1.0	Arasan SF	1.3	½ pint
Dieldrin (25% W.P.)	1.0	Arasan SF	1.3	½ pint
Chlordane (50% W.P.)	1.0	Arasan SF	1.3	½ pint

Jap Beetle Control

GEORGE S. Langford, Univ. of Maryland, reported on "Results from Studies on Insecticides for Japanese Beetle Control", in a paper of which D. W. Squires and B. H. Dozier were joint authors. Both field and laboratory tests, he reported indicate that DDT, BHC, lindane, parathion, aldrin, chlordane, methoxychlor, "Rhothane," dieldrin and toxaphene are effective, either as emulsions or wettable powders, for killing Japanese beetles and protecting plants.

Satisfactory control in the field was obtained with DDT, methoxychlor, "Rhothane," chlordane, toxaphene, dieldrin, and aldrin at a dosage level of 1 pound of technical material in 100 gallons of water. Effective controls were obtained with both wettable powders and emulsions in the case of all the insecticides with the exception of aldrin and dieldrin. These latter two materials were found effective as emulsions, but were not tested as wettable powders.

Laboratory studies, based on spraying and the exposure of beetles to residues, indicated that aldrin, chlordane, methoxychlor, "Rhothane," dieldrin and toxaphene all compare favorably with DDT for killing beetles when used pound for pound. In laboratory tests, spray solutions containing 1/720 lbs. (.0014 lbs.) of either technical parathion or the gamma isomer of lindane gave complete knockdown and kills of 98 and 100 per cent over a period of 24 hours. In field tests, where either 0.3 lbs of technical parathion or 0.1 lb. of gamma isomer in 100 gallons of water was used as a spray, satisfactory beetle kills were obtained and plants were freed of beetles.

The rapidity of knockdown or paralyzing effect from the different insecticides varied widely. Two major types of knockdown were observed. The first type was very rapid and often within a period of 1 hour or less a majority of the insects would be on their backs and incapable of righting themselves. The second type of knockdown was gradual and it built up from a low initial knockdown to almost a 100 per cent over a 24-hour period. The insecticide giving the most rapid knockdown was the gamma isomer contained in BHC and lindane. The other insecticides which gave very rapid or quick knockdowns were: methoxychlor, DDT, "Rhothane" and parathion. The knockdown from clordane, dieldrin, aldrin and toxaphene when compared pound for pound with DDT was slow and gradual, but ultimate kills were good. The slowest knockdown came from chlordane.

James A. Cox of Erie County Research Laboratory, North East, Pa., in his paper "Plum Curculio Control on Prunes", reported on

(*Turn to Page* 89)

THE MOST EFFECTIVE-ECONOMICAL METHOD OF INSECT CONTROL

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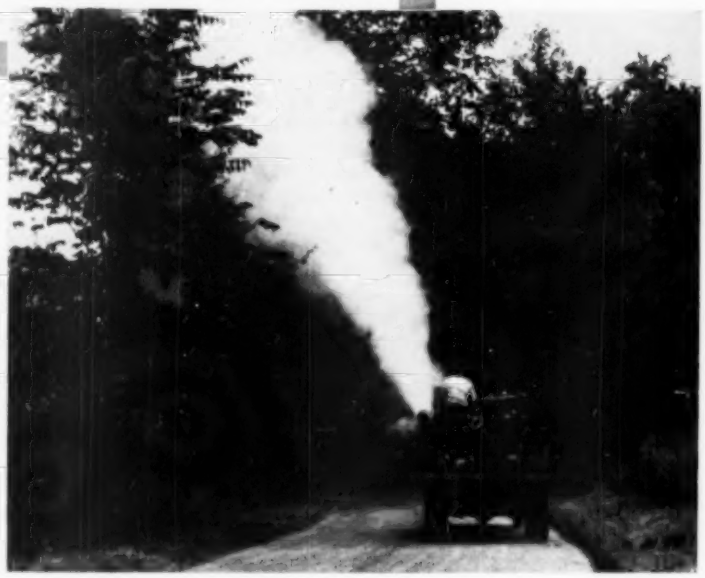

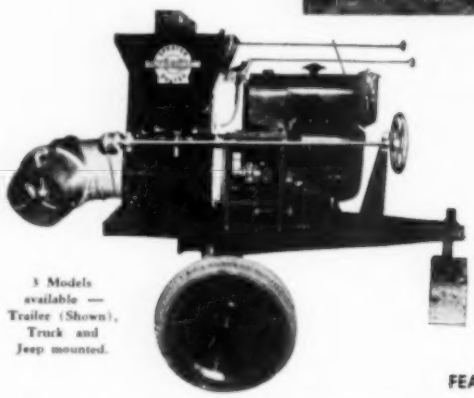

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High velocity, turbulent air, produced by Buffalo Turbine's exclusive axial flow blower, atomizes sprays, dusts, concentrates into micro particles that thoroughly penctrate the thickest growth. The fact that air, not water, is the carrier, cuts the time wasted stopping for water to a minimum.

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FEATURES:

- ★ Uses all standard sprays, dusts, concentrates singly or in combination.
- ★ Range: up to 200-ft. horizontally, 125-ft. vertically.
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The Heart of the Buffalo Turbine Sprayer-Duster is the Axial Flow Blower.

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Manufacturers of the Original Mist Sprayer-Dusters

January 3-5 dates set for Fifth annual Convention of

Northeastern Weed Conference

THE New Yorker Hotel, New York City is the site for the Northeastern States Weed Conference meeting January 3, 4 & 5. It will be the group's fifth annual convention.

A complete comprehensive program is arranged, covering all phases of chemical weed control from spray machinery to plant physiology. Following are some of the highlights of the three-day program:

Wednesday, January 3

10 a.m. General Session, NEWCC president, H. L. Yowell, Esso Laboratories, Linden, N. J. presiding. On this portion of the program will appear R. L. Lovvorn, head, Division of Weed Investigations, U.S.D.A., Washington, D.C.; P. J. Linder, U. S.D.A. Bureau of Plant Industry, Beltsville, Md.; S. L. Dallyn and R. D. Sweet, Cornell University, Ithaca, N. Y.; W. R. Mullison, L. L. Coulter, and K. C. Barrons, Dow Chemical Co., Midland, Michigan.

Wednesday Afternoon

S. M. Raleigh, Penn State College, presiding. Beginning at 1:30 p.m., the program will include papers by C. L. Hamner, Michigan State College; H. E. Clark, Rutgers University; R. J. Aldrich, U.S.D.A. Field Agent; J. A. Kramer, Boyce Thompson Institute; F. S. Spon, Pacific Coast Borax Co.; Nathaniel Tischler, G. P. Quimba and Walter Bejuki, Sharples Chemicals, Inc.; C. E. Minarik, Camp Detrick, Maryland; G. F. Warren, Purdue University; and R. D. Sweet, Cornell University.

Thursday morning's sessions will cover horticultural crops, with J. R. Havis, Virginia Polytechnic Institute, chairman; agronomic crops; turf, with C. E. Phillips, Univ. of Delaware Chairman; control of woody plants; special problems, with Dale E. Wolf, E. I duPont de Nemours & Co., chairman, and a fourth session on public health with A. H. Fletcher, N. J. State Dept of Health, chairman.

On Friday the report of the Coordinating Committee will be presented by R. D. Sweet, chairman.

Officers of the NEWCC, in addition to president Yowell, are: S. M. Raleigh, Pennsylvania State College, vice-president; and W. C. Jacob, Long Island Vegetable Research Farm, Riverhead, secretary-treasurer.

Committee chairmen for the convention include Thomas R. Cox, program; G. H. Ahlgren, contributory membership; R. H. Beatty, publications; H. J. Carew, publicity; and R. D. Sweet, coordinating.

Officers of the Northeastern States Weed Control Conference have completed plans for the 1951 meeting to be held at the Hotel New Yorker, New York, January 3, 4, and 5. Pictures above at a planning meeting are (left to right) standing: G. H. Ahlgren of Rutgers University, trade show chairman; R. H. Beatty, American Chemical Paint, Ambler, Pa., publications committee; Thomas R. Cox, American Cyanamid, New York, program chairman. Seated: W. C. Jacob, Cornell University Vegetable Research Farm,Riverhead, Long Island; H. L. Yowell, Esso Laboratories, Linden, N. J., president of the conference, S. N. Raleigh, Pennsylvania State College, vice-president; and R. D. Sweet, Cornell University.

"At this year's meeting, the conference hopes to determine the status of various weed control procedures for different crops in the northeast and to outline problems needing the greatest attention," according to Dr. Yowell. A session on pre-emergence weeding and sectional meetings on agronomic crops and turf, horticultural crops, public health, and woody plants are among the highlights. Scientists from 13 northeastern states are expected to attend the meeting.

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Conditioned and unconditioned—93% passing No. 325 Mesh or 98% passing No. 325 Mesh. These Dusting Sulphurs are very finely ground and specially processed to resist lumping or caking when stored.

Wettable Sulphurs

Fungicidal Sulphur, minus 10 microns, or 98% passing No. 325 Mesh. These Wettable Sulphurs contain efficient wetting and dispersing agents which make the Sulphurs readily miscible with water for use in orchards or in the preparation of cattle and sheep dips.

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SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEALTH

The Listening Post

Seed Treatments During 1950

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

CONTROL of a virus disease, such as spotted wilt of tomatoes, is not necessarily achieved by control of the insect that carries it, in this case thrips, in individual tomato fields. This is clear from experiments conducted in 1946, 1947, and 1949 by entomologists and plant pathologists at the University of California, reported by A. E. Michelbacher, M. W. Gardner, W. W. Middlekauff, and A. J. Walz, in which field dusting with DDT was tested for the control of thrips and spotted wilt in tomatoes.

Plots in 2 tomato fields were dusted 6 times in 1946. In one field there was considerable spotted wilt infection. The plots in this field were dusted with 5% DDT on May 16 and 28, June 11, July 4 and 19, and August 1. A good control of the thrips population was obtained. Frequently no thrips whatever were found in the samples from the dusted plots for several days after dusting. (Fig. 1).

The percentage of spotted wilt infection was determined by counts made at 8 intervals during the season (Fig. 2). While there was slightly less infection in the dusted plots, *e. g.*, on July 24, 7% vs. 10%, the reduction in spotted wilt was by no means proportional to the reduction in thrips population.

Similar tests were made in 2 fields in 1947. The plots were dusted on May 17 and May 30 with 5% DDT and on June 9, 19, July 3, with 10% DDT+ 25% sulfur to control the tomato russet mite. Frequent counts showed that an excellent control of thrips was obtained (Fig. 3). Again the reduction in percentage of spotted wilt was slight,*e. g.*, 15% vs. 21% on September 12 in one field. (Fig. 4).

In 1949 similar tests were repeated with a 5% DDT dust. The first application was late (June 29) and control of thrips was less satisfactory than in the other 2 years. Again there was only a slight reduction in the percentage of spotted wilt.

The results in the first 2 years when the reduction of spotted wilt was not at all proportional to the control of thrips may be explained by assuming that there was little or no spread of infection from plant to plant within the field, and that all of the infection resulted from flight or migration of infective thrips into the field from outside reservoirs of infection, such as infected ornamental plants, as has been observed to be true in other regions.

Fungicide Tests

T. W. LEUKEL, of the U. S. Bureau of Plant Industry, Soils, and Agricultural Engineering, reports that laboratory and field investigations of the effectiveness of relatively new fungicides, in comparison with more or less standard materials, were continued at the Plant Industry Station at Beltsville, Maryland, in 1950. Separate portions of seed of Texas Blackhull kafir and Leoti sorgo were

Figure 1

Reduction of thrips poulation in tomato field by dusting with DDT in 1946. Dust applied 5-16, 5-28, 6-11, 7-4, 7-19, and 8-1.

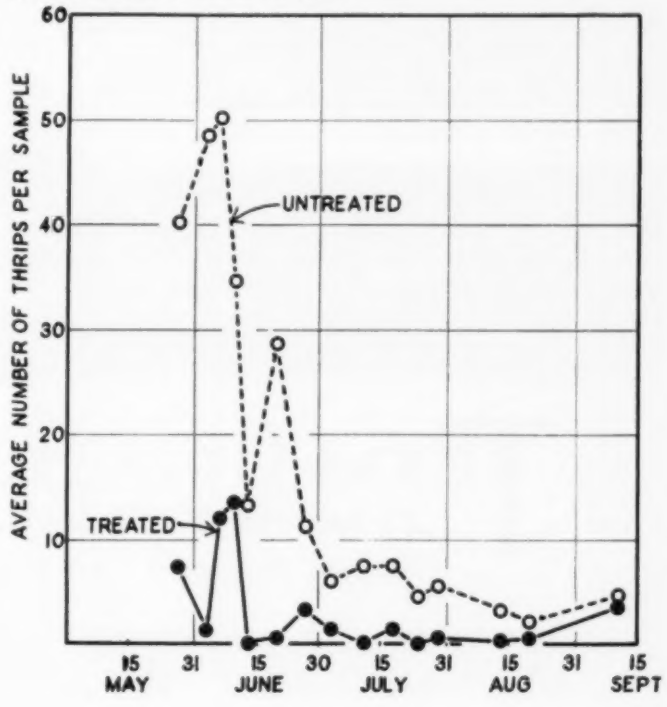

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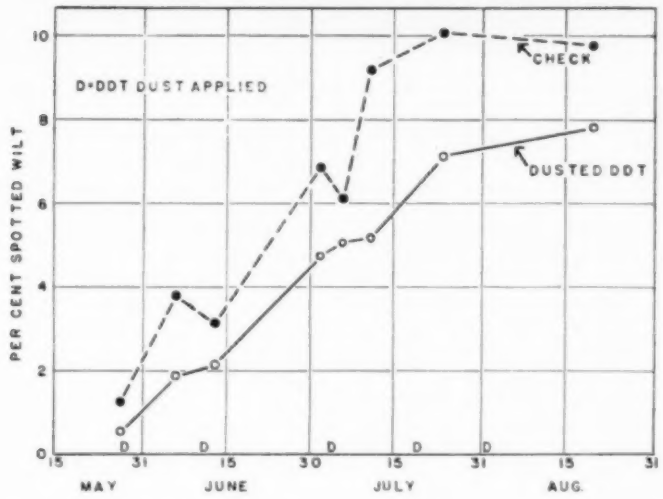
Figure 2

Reduction of spotted wilt infection in tomato field by dusting with DDT in 1946. Not proportional to the good control of thrips shown in Fig. 1.



inoculated with covered kernel smut and were treated with different fungicides on May 9. Emergence tests were made in non-sterilized soil at 20° and 25° C., one week after treatment. Field plantings were made in triplicated 25-foot rows June 8. The data on emergence and on the control of covered kernel smut are given in Table 1, on page 82B.

The results of the emergence tests are not very consistent. At 20° C. emergence from 11 of the 18 treated lots of Kafir was better than that from untreated seed, but only three of these differences approach the level of significance. There were no significant increases over the check at 25° C. and no significant decreases at either temperature.

In Leoti there were eight significant increases over the check at 20° C. and one at 25° C. There were no decreases at 20° C.

All treatments except "Anticarie" and "Mercuran A. L." controlled covered kernel smut perfectly in both varieties.

The three C & C dusts, L-224, 640 and 54000, were received two days before planting time and hence

(*Turn to Page 82B*)

Figure 3

Reduction of thrips population in tomato field by dusting with DDT in 1947. Dust applied 5-17, 5-30, 6-9, 6-19, 7-3, 7-19.

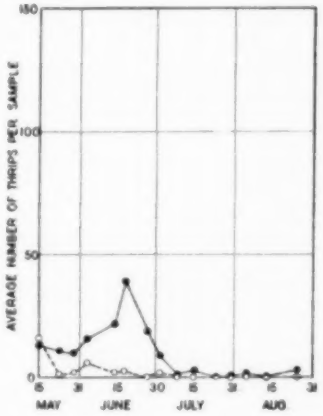
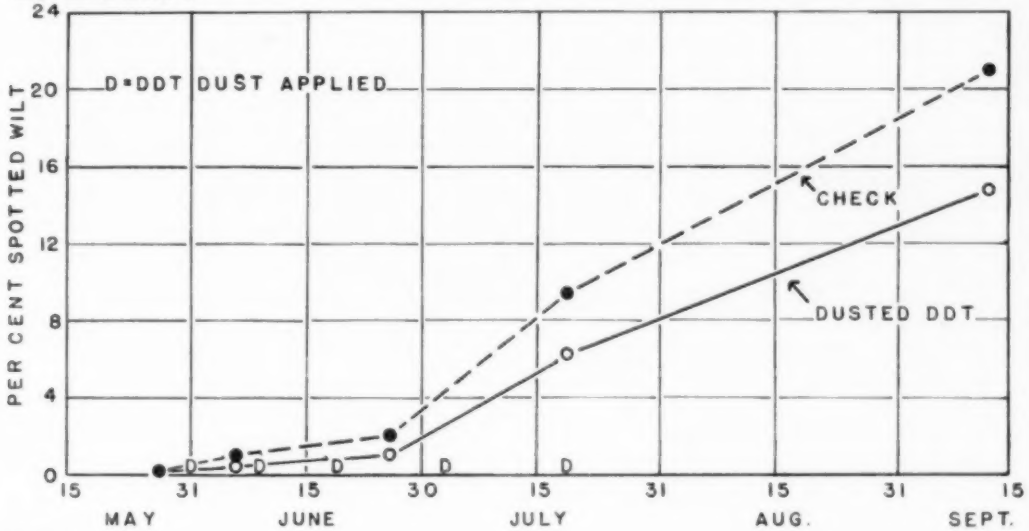


Figure 4

Reduction of spotted wilt infection in tomato field by dusting with DDT in 1947. Not proportional to the good control of thrips shown in Fig. 3.



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Technical Briefs

2,4-D for Water Hyacinth

Among the articles in the July-September, 1950, issue of *Contributions from Boyce Thompson Institute* is a study, "Growth and Reproduction of Water Hyacinth and Alligator Weed and Their Control by Means of 2,4-D. The authors are A. E. Hitchcock, P. W. Zimmerman, Henry Kirkpatrick, Jr., and T. T. Earle.

Tests conducted in 1948 and 1949 showed that an 8 lb. per acre dose of 2,4-D was effective throughout the year in causing water hyacinths to sink within two or three months. The esters of 2,4-D were about equally as effective as the amine salt, and 2,4-D was more effective than 2,4,5-T. It was found difficult to get satisfactory control with a single application, and it was found desirable to apply a second treatment to surviving plants before any substantial reinfestation occurred.

Alligator weed was also easily dislodged and sunk by treatment with 8 lbs. per acre of the 2,4-D amine salt. Effective control of both plants depended on efficient use of spray equipment. Sprays delivered by low-pressure equipment (150 lb. p.s.i. or less) were found to be more effective than sprays delivered at pressures above 150 lb. p.s.i.

When chopped hyacinths and chopped alligator weed were thrown into experimental pits, much of the material floated and there was abundant regrowth from this material within a month. If the chopped material was sprayed with 2,4-D, however, the plants sank, and regrowth was inhibited.

•

Methoxychlor on Alfalfa

Methoxychlor is recommended above DDT as an insecticide for use on alfalfa against weevils, lygus bug nymphs, etc., on the basis of tests recently completed at the Utah Agricultural Experiment Station at Logan, Utah. In describing the tests, at the recent FDA tolerance hearings, Dr. Clyde Biddulph of the Logan Station reported that cows fed hay from DDT-treated alfalfa fields accumulated a build-up of DDT in various tissues and also secreted the material in their milk. Methoxychlor gave satisfactory control, and its use resulted in no accumulation of the insecticide either in the animals fed on the treated hay, or in the milk. E. I. du Pont de Nemours & Co., *Agricultural News Letter*, November-December, 1950.

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Study of Translocation

Five vegetable crops were grown in the greenhouse and field in soil containing concentrations of insecticides. Observations were made to determine whether the germination, growth and yield of plants were affected whenever possible. The plants were infested with suitable insect species as a qualitative indication of the presence of a toxicant in the plant tissue. Two methods of assaying plant tissue biologically with the aid of *Aëdes* larvae were compared and both found to be sufficiently sensitive to yield a quantitative indication of the presence of a toxicant in the presence of plant tissue.

It was determined that when potatoes were grown in soil containing 10 pounds per acre of the gamma isomer of benzene hexachloride that the rate of sprouting and growth was retarded and that proportionally greater retardation was observed at higher concentrations. Aqueous supensions and benzene extracts of the potato foliage and tubers were highly toxic to *Aëdes* larva. The presence of a toxicant was also indicated when these tubers were infested with larvae of the potato tuber worm. Bioassay tests also indicated that a large amount of toxicant persists in this soil at harvest time.

Bioassay tests of potatoes, grown in soil containing 25 pounds of parathion per acre, indicated the presence of a toxicant. Chemical analyses indicated that the plant above ground, the tubers and the soil at harvest time contained appreciable amounts of a material which upon analysis indicated the presence of parathion.

Summary of Rutgers University Journal Series, *Absorption and Translocation of Insecticides through the Root Systems of Plants*, by Ordway Starnes, New Jersey Agricultural Experiment Station, New Brunswick.

•

Flavor Studies Conducted

Experiments were conducted to determine whether benzene hexachloride, chlordane and parathion imparted any off-flavors to fresh, frozen or canned peaches. More than 125 samples, on which different insecticides had been used at different rates and dates of application, were examined.

The results showed that the benzene hexachloride used in these experiments did impart an off-flavor to peaches, but that parathion and chlordane did not. The off-flavor produced by benzene hexachloride was more noticeable in the canned peaches than in the frozen or fresh fruit. All four of the benzene hexachloride compounds produced off-flavor in the canned peaches when they were used later than the shuck-off spray. However, little or no off-flavor was detected in the frozen or fresh peaches which had been sprayed within five to seven weeks of harvest with the two benzene hexachloride compounds containing the refined gamma isomer, but off-flavor was apparent in the frozen and fresh fruit where the technical benzene hexachloride compounds were applied at the same time.

The results to date indicate that it is not safe to use benzene hexachloride later than the shuck-off stage; therefore, it is recommended that it be used only in the petal-fall and shuck-off applications.

Another factor which plays an important role in determining whether an insecticide should or should not be recommended for use on a commercial scale is the residue of the chemical on the surface and/or in the flesh of the fruit. Adequate residue analyses were obtained only of the peaches sprayed with parathion. The

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data showed that there was very little of the chemical present in the peel and none was found in the canned fruit where six applications of a spray containing two pounds of 25 percent wettable parathion powder per 100 gallons were made. The sixth application was applied seven weeks before harvest. It is doubtful, therefore, if parathion would present a residue hazard if only four or five applications (which should be adequate for curculio control) were used with the last application made approximately four weeks before harvest.

"The Effect Of Various Organic Insecticides On The Flavor of Peaches," by J. H. Cochran and L. O. Van Blaricom in 61st annual Report of South Carolina Agri. Experiment Station.

•

Boron Influences Studied

Corn plants were grown in sand culture using the continuous flow method with six different kinds of nutrient solutions which contained different calcium and boron concentrations. A qualitative and quantitative study was made of the response of the plants to the different calcium and boron levels. The results may be summarized as follows:

1. Plants showing symptoms of boron deficiency were found by chemical analyses to have a low content of total and soluble boron and those showing symptoms of boron toxicity a very high content of total and soluble boron.

2. Boron deficient plants were characterized by the appearance of elongated, white transparent stripes in the newly formed leaves. The growth of boron toxic plants was stunted, their top leaves yellow or yellow-green and margins and tips of lower leaves brown and dead.

3. Composite samples of the whole tops of plants showed by analysis that both total boron and soluble boron were largely independent of the calcium concentration in the substrate, except that soluble boron content of the plants grown with the highest boron level (20.0 p.p.m.) was less when supplied with nutrient levels of 500.0 p.p.m. calcium than with the lower calcium levels.

4. The accumulation of calcium in the composite tissue samples of the tops was found to be largely determined by the calcium concentration in the substrate, except that at the highest nutrient level of boron (20.0 p.p.m.) the calcium content of the tissue of plants grown with high nutrient levels of calcium (100.0, 250.0, 500.0 p.p.m.) was higher than those of plants grown at lower nutrient levels of boron.

5. Boron deficiency symptoms increased in severity with increasing calcium concentration of the substrate throughout the range of the four highest nutrient levels of calcium, except that somewhat more intense boron deficiency symptoms were detected at 250.0 p.p.m. calcium than at 500.0 p.p.m. calcium concentration. Top leaves of boron deficient plants grown at 0.0 p.p.m. boron and which showed boron deficiency symptoms had, in general, lower total and soluble boron content than top leaves of plants grown at the same boron level but at the two lowest calcium levels which did not exhibit boron deficiency symptoms. The older tissues of these plants showing external boron deficiency symptoms had a considerably higher total and soluble boron content than the younger tissues (top leaves).

6. The results of this study indicate that there is a limited rate of translocation of boron from the lower portions to the top leaves of boron-deficient plants.

7. Boron toxicity decreased in severity with increasing calcium concentration of the substrate.

8. Increasing the concentration of boron in the culture solution resulted in a marked increase of total and soluble boron in all tissues of the plant.

9. There was a greater accumulation of calcium and boron in the older tissues of the plant than in the tissue where the meristematic activity was highest.

10. The calcium content of the tissues was determined to a large degree by the calcium concentration of the substrate and was largely independent of the nutrient level of boron.

11. Differences in the soluble calcium contents on the top leaves of calcium-deficient plants were related to the soluble boron content of the tissues, which in turn were determined by the boron concentration of the substrate.

12. The quantitative relationship between calcium and boron within the plant plays an important role in the metabolic activities of the plant. Boron deficient plants had a high Ca/B ratio, while boron toxic plants had a very low ratio.

13. At a given boron level, increments in the boron concentra- increments in the calcium concentration in the substrate caused an in- tissues.

14. At a given calcium level, increments in the boron concentration in the growth media caused a decrease in the Ca/B ratio of the tissues.

—Journal of Agriculture of Univ. of Puerto Rico, 1950.

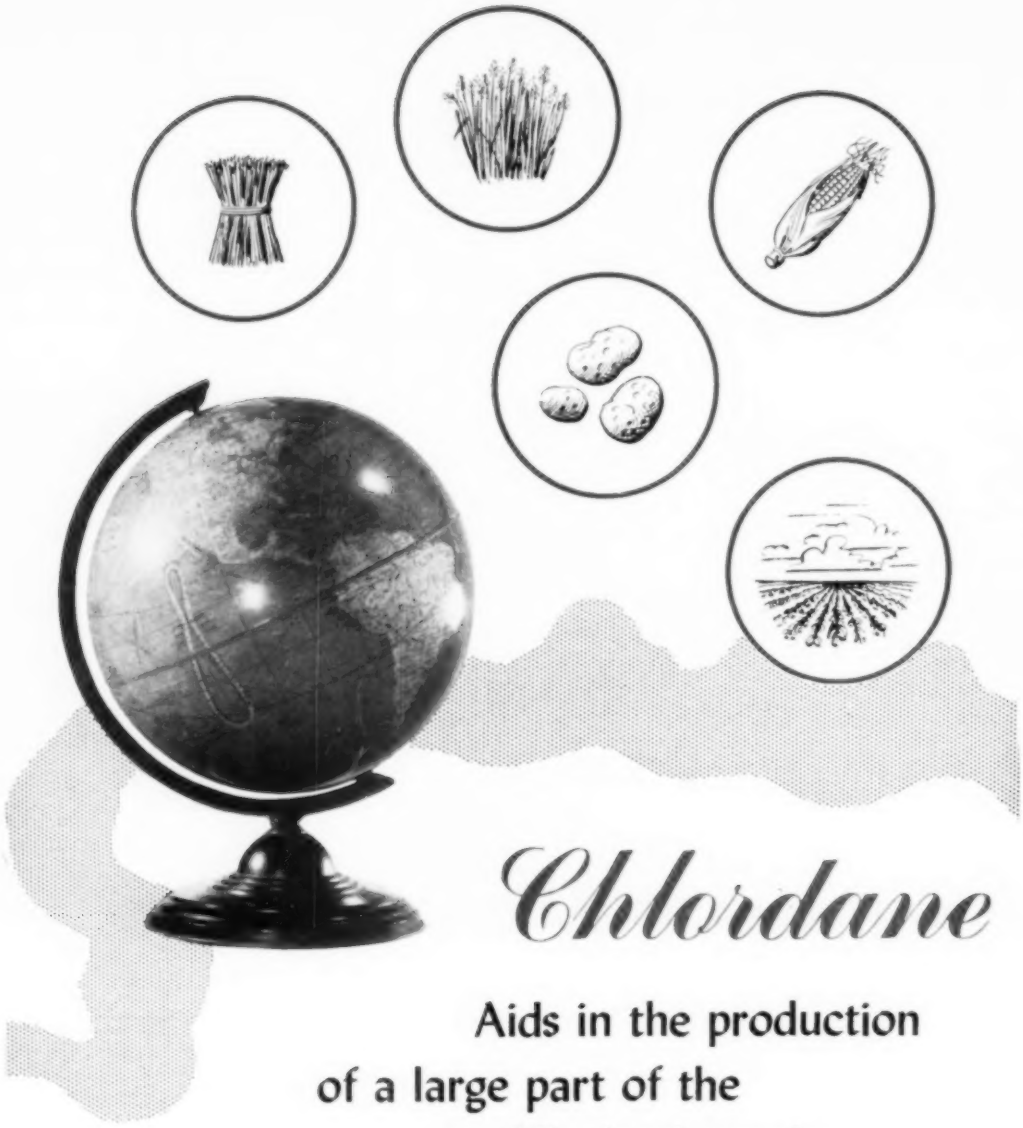
•

Weed Control in Berries

There is a definite need for a special weed control product to kill over-wintering weeds such as chickweed, red sorrel, clovers, wild beet, etc., in strawberry fields, according to the November, 1950, issue of *Horticultural News*, published by the Missouri State Horticultural Society, Columbia, Miss.

Dinitros in oil have been used with some success, it is pointed out, but a sufficient control of perennials is not secured. IPC has been used successfully for chickweed, but it does not kill some of the other weeds such as red sorrel. The material which appears most suitable for Missouri is 2,4-D. One application of 1½ or 2 pound acid equivalent per acre amine salt formulation kills wild beet and several other weeds. For well established stands of white clover and red sorrel such as may be found in old fields it may take two applications of 1½ pounds each.

Early November is recommended as an excellent time to apply 2,4-D. This chemical should not be applied during the period of fruit bud differentiation which may occur from late August to late October.



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Delaney Committee Hearings Resume

L. S. Hitchner executive secretary of the National Agricultural Chemicals Assn., and Dr. John Fougler of the Manufacturing Chemists Association Testify at Opening Session, November 28th

STATING that existing legislation covering the distribution and use of chemicals for agriculture, is adequate to protect the public health, Lea S. Hitchner, executive secretary of the National Agricultural Chemicals Association, Washington, testified before the Select Committee of the House of Representatives on November 28. The committee, organized under authority of the Sabath Resolution to investigate the use of chemicals in food products, convened on that date following a recess which had been in effect since November 17.

Mr. Hitchner presented strong testimony establishing the necessity of pesticides for the production of adequate food and fiber; pointed out that the pesticide industry had always backed the enactment of sound legislation on the state and federal level; and declared that existing legislation makes possible adequate protection to the public. He introduced a number of exhibits to illustrate these points; among them a 700-page abstract of the testimony presented by 246 witnesses at the recently-completed Food and Drug Administration Hearing, containing evidence covering necessity for use, residues and toxicological research by both government and industry research. The transcripts of the hearing he said, represent "all of the current available knowledge on this subject."

In his introduction, the NACA executive stated that his remarks were to be limited to pesticides and not to fertilizers or other chemicals added to food. He pointed out that the industry is "vitally interested in the health of the public," and reminded that chemical workers and farmers who use these chemicals are consumers of food products "just like everyone else." The abundant production of high-quality, wholesome food is of interest to everyone, he said, and stated that the pesticide industry wishes to cooperate with the Committee and agencies of the government working to improve the already high standards.

Crediting pesticides with contributing to both the abundance and quality of foodstuffs in America, Mr. Hitchner pointed out the increasing life expectancy of Americans and the higher health level now enjoyed here. He reviewed figures which indicated that a century ago eight persons on the farm were required to feed themselves and two persons in town, whereas today, two persons on the farm produce enough to feed themselves and eight people in town, and 2 people in other nations. "This record production of high quality food and fiber depends in no small degree on the availability of a wide range of pesticides. Without the widespread use of pesticides, we as a nation would go hungry."

In discussing the industry's attitude toward sound legislation, Mr. Hitchner told the Committee that industry members in 1940 regarded the then-effective Federal Insecticide Act of 1910 as not offering adequate protection to the users of insecticides. He related then how the industry, in cooperation with the U. S. Department of Agriculture, the Council of State Governments and members of the House Agriculture Committee worked toward the development of what is now the Federal Insecticide, Fungicide and Rodenticide Act of 1947. The industry also cooperated in the enactment of the original act of 1910, he declared.

The industry has also been interested in the development of a uniform state insecticide, fungicide and rodenticide act, he reminded. Whole-hearted cooperation has been given to the other groups sponsoring the adoption of the uniform law in all states. Beyond this, the industry is interested in a uniform custom applicator's law, drafted by the Council of State Governments and other groups to insure safe application of pesticides by air and otherwise.

Pesticide Use Necessary

TO point out the necessity for use of pesticides in food production Mr. Hitchner quoted a number of well-known authorities in the field after making the observation that growers do not use pesticides because they want to, but because of "dire necessity." No farmer will purchase hundreds of dollars worth of pesticides to produce a crop unless they are necessary, he declared.

Dr. F. C. Bishopp, assistant chief of the Bureau of Entomology and Plant Quarantine, U. S. D. A., was quoted from his testimony before the Residue Tolerance Hearing. Dr. Bishopp pointed out that fruits and vegetables would be unmarketable without the use of insecticides, whether the standard is set by consumers, market graders, or inspectors of the Food and Drug Administration. Without the use of insecticides, many products now enjoyed by the American public would no longer be found in our markets. The fruits and veget-

ables of high quality now reaching the consumer are not accidental. They are available by virtue of carefully planned and executed control of insect pests and plant diseases through the use of insecticides and fungicides.

If restrictions are placed against the use of some of these materials and inferior ones are substituted because they might be considered safer, the costs of production will increase materially, the consumer will be forced to pay more and the standard of living in this country will be lowered, Dr. Bishopp concluded.

Dr. Paul J. Chapman, head of the Division of Entomology of the New York State Agricultural Experiment Station, Geneva, N. Y., was quoted on the use of pesticides on fruit trees. He said that the industry has now become so dependent on pesticidal treatments that it virtually cannot exist without them. 'For example, I do not know of a single commercial apple orchard in the state that receives fewer than five pesticidal sprays or dust treatments annually. The majority receive more,' he said.

'Furthermore, modern pest control is a dynamic thing. We can't rest on our laurels nor consider any pest control problem permanently solved,' he concluded.

Touching on the production of citrus, the testimony of J. R. LaFollette, California Fruit Growers Exchange entomologist was quoted by Mr. Hitchner. 'Control of pests, next to irrigation, is the most necessary part of citrus production,' Mr. LaFollette was quoted to have told the Tolerance Residue Hearing.

Dr. T. C. Allen, University of Wisconsin, has reported that of a total of 12 million dollars worth of shelled peas grown in his state, at least 15% was due to the use of pesticides, Mr. Hitchner told the Committee, adding that the 15% gain in income equaled some $1,800,000 compared to an insecticide outlay of only $294,872, or a return of six dollars for every dollar invested by the pea growers in insecticides.

Mr. Hitchner's statement emphasized that pesticides are not sold without legislative control, but on the contrary, he reminded, few industries have to comply with more laws and regulations in order to sell their products. He entered as an exhibit, a chart showing the legal requirements in various states, as relating to the industry. The Federal Insecticide, Fungicide and Rodenticide Act of 1947 was also offered as an exhibit, and Mr. Hitchner called to the attention of the committee the sections of the Act covering the definition of the term, "misbranded."

"In addition to the Federal and State laws covering the sale of pesticides, we must also comply with regulations issued by the administrative agencies of the Federal and State governments," he observed. As further exhibits, he presented the regulations, and interpretations with respect to warning, caution and antidote statements required to appear on labels.

He pointed out that the State of California has strict registration requirements on economic poisons, and declared that the Food and Drug Administration has full authority to seize any food which, in their opinion, contains a poison or deleterious residue which may be injurious to health. "The law also provides for the establishment of residue tolerances, and in our opinion the residue problem on fresh fruits and vegetables will be determined shortly by the F.D.A. in accordance with evidence submitted at the recent hearing," he said. It was pointed out further that "there

(*Turn to Page 85*)

Coleman, Bear and Cummings Testify

APPEARING before the select committee on December 5, Dr. Russell Coleman, president of the National Fertilizer Association, Washington, D. C., told the congressmen that there is no scientific evidence to indicate that commercial or chemical fertilizers used on plants and crops have ever been harmful to the well-being of either animals or man.

On the contrary, it is estimated that without the help of commercial fertilizers, at least 80 million additional acres of productive land would be needed to feed and clothe the population. And such an amount of land is simply not to be had, he declared.

Asserting that if the "black magic" line of reasoning is carried through to cover the use of all chemicals, "its logical conclusion would be for us to shun the use of atabrine, aspirin, novacaine and sulfa drugs and rely only on such natural products as roots and herbs such as were used by the old witch doctors." He continued by pointing out to the congressmen that there is no basis to the claim that heart disease, cancer and other old-age diseases are becoming more prevalent because of increased use of chemical fertilizers. "The state which uses more fertilizer than any other, North Carolina, has the lowest cancer rate in the country, and one of the lowest from heart diseases," he reminded.

Another witness, appearing on behalf of fertilizer use, was Dr. Firman E. Bear, Rutgers University agronomist, who told the committeemen that fertilizers stand between civilization and starvation "for centuries to come."

Ralph W. Cummings, director of the North Carolina Agricultural Experiment Station, said there is no justification for believing that human health has been affected adversely by the use of chemical fertilizers. If stricter legislation must be imposed on the use of chemicals, he stated, there should be no single common act to regulate insecticides, fertilizers and food chemicals.

* * *

Names of members of the Fertilizer Advisory Committee should be out shortly. . . Anglo-Chilean Nitrate Co. and its affiliate, Lautaro Nitrate Co. may consolidate, we hear. Announcement of proposal was made early this month.

Advances in Chemotherapy . . .

noted at Phytopath meeting in Memphis. Society elects Horsfall, McNew & McCallan as Officers

DISCUSSING new fungicides for control of plant diseases, as well as presenting data on late research, the American Phytopathological Society held its 42nd annual meeting at the Peabody Hotel, Memphis, Tenn., December 1-3. The group elected as president for 1951, Dr. James G. Horsfall, director of the Connecticut Agricultural Experiment Station New Haven. He succeeds Dr. C. M. Tucker, Columbia, Mo. The new vice-president is Dr. George L. McNew, managing director of Boyce Thompson Institue for Plant Research, Yonkers, N. Y., succeeding Dr. Horsfall. Secretary of the APS for 1951 will be Dr. S. E. A. McCallan, Boyce Thompson Institute, and a member of the editorial advisory board of *Agricultural Chemicals*. He succeeds Dr. Curtis May, U. S.Dept. of Agriculture, Beltsville, Md., as secretary. The group named as Councilor-at-large, George C. Kent, head of the department of plant pathology, Cornell University. Remaining as treasurer of the society and business manager of *Phytopathology* is Dr. A. E. Dimond, Connecticut Agricultural Experiment Station, New Haven. Dr. Helen Hart, University of Minnesota, will continue as editor-in-chief of *Phytopathology*.

More than 170 papers were presented at the three-day conference with concurrent sessions under way morning, afternoon and evening of each day.

Chemotherapeutics

A PAPER describing the chemotherapeutic properties of 4, chloro-3,5-dimethylphenoxyethanol and 2-norcamphane methanol was presented by A. E. Dimond and R. A. Chapman, Connecticut Agricultural Experiment Station, New Haven. These compounds have ability to eliminate incipient infections by *Fusarium dianthi* on carnations and F. *lycopersici* on tomatoes. In controlled greenhouse experiments, these compounds were applied in aqueous solution to the substrate of tomato plants and were absorbed through the roots. After inoculation with *F. lycopersici*, such plants have repeatedly been in low disease grade, whereas check plants were heavily diseased, the authors reported. To be effective, treatment must be made serially in advance of infection. The therapeutic effect is short-lived. The materials act inside the host plant to prevent establishment of infection through mycelial growth. The first material (4-chloro-3,5-dimethylphenoxyethanol) has a formative effect upon tomatoes and has given more consistent protection than the second compound which has a characteristic odor which it imparts to foliage of plants absorbing it.

"Fungicidal control of leaf spot and mildew on nursery cherry trees in Iowa" was the title of a paper presented by H. C. Fink and O. F. Hobart, Jr., Iowa State College, Ames. They reported that tests made in 1948, 49 and 50 were made on nursery cherry trees for comparison of leaf spot and powdery mildew control. Fungicides and the rate in pounds per 100 gallons of water were: ferbam, 0.5, zineb, 1,2&4; "Phygon," 0.5, 1 and 2; "Bioquin," 0.5, 1 and 2; "341 B Cherry Spray," 1, 2 and 4; "Puratized," 0.5, 1 and 2; "Merck H258M," 0.75, 1.5 and 3; "Ortho 406," 2; tribasic copper sulfate 2,4 and 8; lime sulfur, 2.4; and wettable sulfur, 4.

An 8-4-100 Bordeaux mixture was also used. For leaf spot control, as measured by percentage of defoliation, Bordeaux mixture was most effective. Tribasic copper sulfate was nearly as effective.

For control of powdery mildew, tribasic, Bordeaux and "Phygon" were most effective in that order, the paper said. Among the variously sprayed plots in 1949, tree height and caliper were greatest in those sprayed with tribasic, Bordeaux and ferbam. Second year growth was greatest in these same plots, it was reported.

John W. Gibler, Minnesota Agri. Experiment Station, presented a paper describing experiments in which soybean seeds were pelleted with fungicides for control of damping-off and root rot. His paper said that in a preliminary test, Ottawa Mandarin soybean seeds were pelleted with 35 different fungicides and planted in the greenhouse in soil artificially infested with *Rhizoctonia solani*. In the preliminary test, four fungicides were very effective. These were "Arasan," "Arasan SF," "Tersan" and "Leafox 200A." The remaining 29 fungicides were either phytotoxic or ineffective. The four most successful compounds were tested further in both greenhouse and field at the rates of 8, 16, 32, 48 and 80 ounces of fungicide pelleted on 100 pounds of seed along with a standard dust application of 3 1/3 ounces of fungicide per 100 pounds of seed. The dust application did not control damping off and root rot, but control was excellent with the 8-oz. application pelleted on the seed. This rate was as effective as the higher rates.

Another paper on soybean seed treatment tests was presented by Howard W. Johnson, U.S.D.A., Beltsville, Md. He told of experiments comparing "Arasan" and "Arasan S-F" on seed of five soybean varieties. In 1947, these seeds were planted at 10 locations in the south, with the results showing increases in stand of approximately 10% at all locations except one, on each of three planting dates. At Stoneville, Miss. in 1948, the paper said, "Dow 9-B," "Ceresan M," "New Improved Ceresan," "2% Ceresan," "Spergon" and "Arasan" on the seed of eight soybean varieties resulted in highly significant stand increases ranging from 7 to 15 percent. Yield differences, however, were not significant.

At Stoneville in 1949, improvement in stand over the nontreated checks ranged from a low of 4% to a high of 26%. Yield increases were 3.7 bushels per acre for treatment with "New Improved Ceresan;" 4.1 bu. with "Spergon" and 4.5 bu. for "Arasan." At Stoneville in 1950, percentage of improvement in stand over the nontreated checks was 12 for "Vancide 51," 13 for "Arasan" and 16 for "Spergon" in a test involving 16 soybean strains. The authors conclude that seed treatment will improve soybean stands consistently in the south and in some years will increase yields .

That high populations of pathogenic nematodes do not necessarily result from continuous cropping with potatoes, was the conclusion gained from tests reported by B. F. and J. W. Lownsberry and W. F. Mai, Cornell University, Ithaca, N. Y., as reported in their paper presented at the APS meeting. Comparison was made of the kinds and numbers of nematodes present in several fields where potatoes had been grown continuously for 20 to 30 years, and other areas of the same soil type where they had been grown a short time or not at all.

Upon removing nematodes from the soil, a species of *Pratylenchus* was found in each of the fields sampled. *Xiphinema americanum, Criconemoides* sp. and a *Pratylenchus* species were found in woods adjacent to a field in which potatoes had been grown continuously for 20 years, but only the *Pratylenchus* species were found in the field itself.

When potato roots grown in soil from the various fields were examined, two species of *Pratylenchus* were the only nematodes found in quantity. Results of this survey indicate that high populations of pathogenic nematodes do not always result from continuous cropping with potatoes, the authors concluded.

Two papers by Ray Nelson, Michigan State College, were presented. The first dealt with control of mint rust with dust fungicides, and the second on control of onion mildew with dust fungicides.

In the first paper, Mr. Nelson told of experiments on row plantings of Scotch spearmint, in which the plants were dusted in 1948, 1949 and 1950. Control plants were moderately rusted in 1948, rust-free the next year,

but killed by the disease in 1950. Under the severe conditions of 1950, "Fermate" gave superior protection, Mr. Nelson reported.

His second paper, "Control of Onion Mildew with Dust Fungicides," described the results of tests from 1946 to 1950, during which time the mildew was destructive in only 1947 and 1950. In 1947, he said, dusts were more effective than sprays, and maximum mildew control and yield increases were obtained with "Dithane Z-78"-sulfur and cuprous oxide-sulfur.

With subnormal seasonal temperatures and with moisture conditions suitable for mildew, the disease caused marked injury to experimental fields in 1950. "Dithane Z-78"-sulfur dust controlled the disease better than did other materials and resulted in highly significant yield increases. The cuprous oxide-sulfur dust was apparently injurious under the cool seasonal conditions. The addition of 2% zinc apparently neutralized this toxicity and resulted in yields higher than those in the control plots. In seasons when mildew was destructive, the "Dithane Z-78"-sulfur dust gave the most effective protection, with consequent maximum increases in yield.

Fungicide Colloquium

THE fungicide colloquium, held Saturday evening, was particularly well attended. Chairman of the evening was Dwight Powell, University of Illinois, who introduced the speakers. Dr. L. Gordon Utter, Phelps Dodge Corp., New York, gave a brief summary of the recently-completed hearing by the Food and Drug Administration, pointing out how important had been the work of plant pathologists in establishing data for the FDA's consideration. Dr. Utter also referred to the current hearing before the Delaney Committee, stating that the trend in it seems to be toward establishing a double and perhaps conflicting authority over the manufacture and use of agricultural chemicals. He reviewed the testimony presented to the committee by L. S. Hitchner, secretary of the National Agricultural Chemicals Association, remarking that it should leave no doubt about the existence of laws adequate to regulate and control the pesticide industry. The supply situation was also reviewed by Dr. Utter who said that its outcome was "anyone's guess" with war threats and the likelihood of shortages. He urged the early purchase of any and all pesticide materials for the 1951 season, saying that such may not be available as the new spraying and dusting season opens. Present figures indicate that there may be 20% to 25% less organic material for use in pesticides next year, he warned.

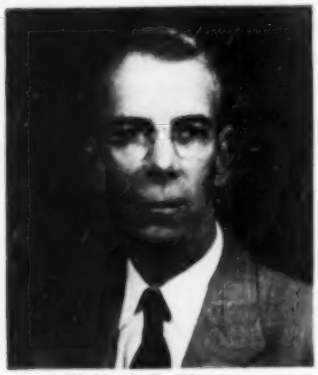
Dr. J. H. Jensen, University of North Carolina, spoke briefly on the utilization of radioactive materials in biological research. In the study of fungicidal action, for instance, he said that the "tagged atoms" may be traced all through a plant so that a researcher

(*Turn to Page* 83)

INDUSTRY NEWS

New Tobacco-By-Prod. Mgr.

Tobacco By-Products and Chemical Corporation has announced the appointment of Richard F. Hatcher as Southern Division Manager in charge of the Montgomery, Alabama, office, where the firm specializes in cotton insecticides. Also announced was the appointment of J. L. Crigler as Assistant Manager.



Richard F. Hatcher

Mr. Hatcher, a native of Winchester, Virginia, has been associated with the firm for 17 years. Until recently, he was District Sales Manager of the southern territory.

Mr. Crigler, who has been in the Sales Division of the corporation for the past 7 years, is a native of Starkville, Mississippi.

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Hoidale Heads Division

Avery S. Hoyt, chief of the Bureau of Entomology and Plant Quarantine has announced that Paul A. Hoidale, leader of the Bureau's Division of Mexican Fruit Fly Control, will succeed Dr. Claude Wakeland as leader of the Division of Grasshopper Control with headquarters at Denver, Col. The change was made to comply with the request of Dr. Wakeland to be relieved of the heavy administrative responsibilities for reasons of health.

Mr. Hoidale has wide experience in the administration of various insect control projects of the Department, dating from 1917. He has worked on many Federal insect control projects in various sections of the country.

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Montana Group Meets

The Montana Agricultural Chemical Association held its Third Annual Meeting at the Civic Center in Lewistown, Montana, on October 27 and 28.

Addresses were given by E. H. Karr, National Agricultural Chemicals Association, Tacoma, Wash.; David Domke, Great Falls, Mont., Montana State Legislator; Frank Wiley, Helena, Montana Aeronautics Ass'n.; R. L. Warden, Bozeman, Extension Weed Specialist; James Krall, Moccasin, Central Montana Experiment Station; Glenn Hartman, Bozeman, Montana State College; and Dr. J. H. Pepper and J. P. Corkins, Bozeman, Office of the State Entomologist. The State Commissioner of Agriculture, Alfred R. Anderson, was represented by Miss Leslie of that office. About sixty consumers, retailers, wholesalers and manufacturers' representatives attended the two day session.

The Montana Agricultural Chemical Association's main functions are to promote educational programs which will further the proper use and point out the limitations of agricultural chemicals, aid in research concerned with agricultural chemicals and disseminate current information regarding agricultural chemicals to members.

Officers elected for 1951 are: Owen P. Lavin, Van Waters & Rogers, Inc., Billings, Mont., president; Charles Lynch, Lynch Flying Service, Belgrade, executive vice-president; R. L. Warden, Extension Weed Specialist, Bozeman, technical vice-president. Members of the executive committee are Penn Stohr, Johnson Flying Service, Missoula; Don Ross, Graham & Ross, Great Falls; and R. L. Robbins, Robbins & Co., Glendive.

Powell Advances Straube

Harold S. Straube has been advanced to General Manager of the John Powell Chemical Co. at Huntsville, Alabama, the company has announced. Mr. Straube succeeds Benton H. Wilcoxon who will now devote his full time to basic chemical manufacturing of an associated firm, Calabama Chemical Co. Frank J. Rush, formerly Comptroller of the firm has been advanced to the position of assistant treasurer.

Harold S. Straube

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Goldberg PMA Consultant

Melvin Goldberg has been appointed as a consultant on agricultural pesticide requirements, distribution and production, to the Production & Marketing Administration of the U. S. Department of Agriculture. He will work on a part-time basis in an advisory capacity to the Office of Materials & Facilities of PMA in Washington, D. C.

During World War II, Mr. Goldberg was associated with the Insecticide & Fungicide Unit of the War Production Board and the work of his present job with PMA will be along the same lines as his former activities with WPB. Mr. Goldberg operates a consulting and technical sales organization in New York City called Pesticide Advisory Service.

ROBERT C. HILLS THOMAS R. VAUGHAN RICHARD C. WELLS

Freeport Elects Three V-P's

Robert C. Hills, Thomas R. Vaughan and Richard C. Wells have been elected vice presidents of Freeport Sulphur Company by the board of directors, it has been announced.

Mr. Hills started with Freeport in 1934 as a chemist at the company's sulphur operations in Louisiana. During the war he served as manager of the metallurgical plant in Cuba of Nicaro Nickel Company, a subsidiary of Freeport. He became assistant to the president in 1946 and director of development at the beginning of this year. Mr. Vaughan, an attorney, joined Freeport in 1942 and became assistant secretary later that year. He has been an assistant vice president since 1947. Mr. Wells came to Freeport in 1939. He was made assistant treasurer in 1942 and in 1946 became controller.

MEETINGS

American Association of Economic Entomologists. Denver, Colorado, Dec. 18-21.

National Joint Committee on Fertilizer Application. Stevens Hotel, Chicago, Dec. 18.

Northeastern Weed Control Conference. New Yorker Hotel, New York, January 3-5.

Nebraska Weed Control Conference, Chemical and Equipment Show. State Fair Grounds, Lincoln, Nebraska, January 4-5.

5th Annual Insect Control Conference With Industry, sponsored by Univ. of Wisconsin, College of Agriculture, Loraine Hotel, Madison, Wis., Jan. 10-11.

Cornell University Arborist's School Ithaca, N. Y., January 15 & 16.

3rd Illinois Custom Spray Operators Training School, University of Illinois, Urbana, January 18-20.

Association of Southern Agricultural Workers, Peabody Hotel, Memphis, Tenn. Feb. 5-7, 1951.

Southern Weed Conference, Hotel Claridge, Memphis, Tenn., Feb. 8 & 9.

Midwestern Chapter, National Shade Tree Conference, La Salle Hotel, Chicago, Ill., Feb. 14-16.

Kansas State Weed Conference, Topeka, February 15 & 16, 1951.

N. Central Branch, A.A.E.E., Commodore Perry Hotel, Toledo, Ohio, March 21 & 22.

1st Annual Meeting, Southwestern Branch A.A.E.E., Adolphus Hotel, Dallas, Tex., Mar. 1 & 2.

Nat'l Agricultural Chemicals Assn, Flamingo Hotel, Miami Beach, Fla. April 4, 5 & 6, 1951.

Hartz Rejoins Powell

George Hartz, connected for the past four years with the insecticide department of Orbis Products Corp., New York, recently joined the technical department of John Powell & Co., New York. Before joining Orbis, Mr. Hartz had been with the Powell organization for seven years. At one time, Mr. Hartz had been with Seil, Putt & Rusby, Inc., New York consulting firm.

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NAC to Florida in April

The National Agricultural Chemicals Association, Washington, D. C., has announced that its annual spring meeting will be held April 4-6 at the Flamingo Hotel, Miami Beach, Fla. Meeting plans have not been completed as yet, but the association is expected to present speakers representing the industry, the U. S. Department of Agriculture and law enforcement agencies.

Further details will be published in *Agricultural Chemicals* as program plans develop.

CSMA Meets in New York

The annual meeting of the Chemical Specialties Manufacturers Association was being held at the New Yorker Hotel, New York City, as this issue of *Agricultural Chemicals* went to press.

Speakers included M. H. Doner, J. R. Watkins Co., Winona, Minn.; Earl D. Anderson, National Sprayer & Duster Ass'n., Chicago; John D. Conner, CSMA General Counsel; R. C. Roark, U.S.D.A.; C. C. Compton, Julius Hyman & Co., Denver; J. E. Bussart, Velsicol Corp., Chicago, W. N. Dickison, H. D. Hudson Mfg. Co., Chicago; and Donald F. Starr, S. B. Penick & Co., New York.

W. G. Reed, Chief, Insecticide Division, U.S.D.A., reviewed operations under the Federal Insecticide, Fungicide and Rodenticide Act since its enactment. J. B. Moore of McLaughlin Gormley King Co., Minneapolis, was to speak on allethrin in aerosols and R. B. Stoddard, U. S. Industrial Chemicals, Inc., New York, was to discuss industry toxicity problems.

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Phillips Advances Seay

The appointment of M. D. Seay as assistant manager of the Houston district of Phillips Chemical Company's fertilizer sales division has been announced. Mr. Seay, who is a native of Madisonville, Texas, attended Angleton High School and graduated from Texas A. and M. College in 1939 with a B. S. degree in agricultural education.

M. D. SEAY

BAE predicts higher but stable 1951 prices

THAT there would be some increase in pesticide prices in 1951 was predicted in a recent statement by the Bureau of Agricultural Economics, U.S.D.A. However, it added that the price level on insecticides and fungicides is likely to be well stabilized by the beginning of the 1951 season, and will probably change but little for the remainder of the year.

Discussing the carry-over of insecticides, the B.A.E. stated that the amount carried over as of September 30, 1950, "was lower than it has been on the same date in the last three years." It was about normal in the northern plains and western corn belt states, but very low in the southeastern and New England states, the report said. It added that carry-overs of pyrethrins and arsenicals were low in most areas of the U.S.. The report continued:

"Supplies of raw materials used in making DDT, benzene hexachloride, and certain fumigants are low, and probably will continue to be in short supply throughout the 1951 season. Despite special efforts, the quantity available next season probably will be less than the quantity used during the 1950 season.

"Supplies of raw materials used in arsenicals and sulphur and copper compounds used in manufacturing fungicides are about normal. Insecticides containing rotenone, ryania, and nicotine, are expected to be available in adequate quantities. But those insecticides that contain pyrethrins may be scarce. Probably enough fungicides will be available to meet essential needs."

Fertilizer Supplies

THE report also covered the fertilizer field, predicting higher prices for fertilizer materials in 1951. However, the cost-price ratio for the buyers of fertilizers should be favorable, the report said, since the prices to be received by growers in 1951 is likely to be higher. This situation should make it profitable for growers to increase the use of fertilizers at a more rapid rate than they have during the last few years, the B.A.E. points out.

In commenting on the supply situation for 1951, the report stated that "the quantity of plant nutrients in fertilizers available for use by farmers during the 1949-50 crop season was about three times the 1935-39 average. The use of fertilizer has risen steadily since the depression years. No doubt most of the increase in tonnage used is accounted for by use on additional land rather than by increased rates per acre, although the latter has been an important factor. Quantities of nitrogen and phosphoric acid used as fertilizer are now about three times the amounts used in 1935-39. The use of potash as fertilizer has increased slightly more, ap-

proximately three and one-tenth times the 1935-39 average.

Plant capacity for production of nitrogen is sufficient to furnish 15 percent more than was available for use as fertilizer last year and also to take care of presently estimated non-agricultural demands. Approximately 1,000,000 tons were available for fertilizer use last year.

There is installed capacity within the industry to produce approximately 2,800,000 tons of available phosphoric acid. A little more than 2,000,000 tons were available for use as fertilizer last year. Probably the only immediate problem in the way of full scale production of superphosphates is the lack of adequate supplies of sulphuric acid.

Present capacity for potash production in this country is about 1,200,00 tons. This is only about 100,000 tons greater than was used as fertilizer last year. But it is expected that during 1950-51 a considerable tonnage of French and Spanish potash will be imported, plus additional tonnage from Western Germany.

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Notes on "Panogen"

We have a communication from Aktiebolaget Lauxe in Casco, Stockholm, Sweden, presenting a series of comments on the efficacy of "Panogen" as a treatment for oat and wheat seeds. In a column by Paul R. Miller in the October issue of *Agricultural Chemicals* (pgs. 51, 53, 69) quoting studies by Dr. Koehler and Dr. Bever, it was stated that there is no satisfactory method of applying Panogen on a commercial scale, thus limiting its use. The statements had been made, for example, that when treated on a commercial scale for smut control in oats that the product gave poor results; that heavily treated kernels resulted in only 23.2% germination.

The firm advises that many millions of bushels of seed were treated in the United States and Canada in 1950, and that no claims of poor smut control were made. As to the point of poor germination of heavily colored seeds, they point out that in all seed lots there is a certain percentage of mechanically injured and abnormal seed which has been found to absorb more of the color

Table

	Panogen 2.1% Hg		Panogen Hg free	
	Percent kernels divided by color	Percentage Germination	Percent kernels divided by color	Percentage Germination
Check - untreated	.....	69	.....	69
Strongly colored	1.52	66	1.54	67
Moderately colored	7.04	78	6.91	67
Weakly colored	91.44	83	91.55	73
Random sample	.....	88	.....	71

material from the Panogen liquid than does normal seed. This abnormal seed would be expected to give but poor rates of germination in any case, they point out. Such seed, however, represents only 2-5% of the total in most cases, and being present in such a small percentage does not make any great difference in the percentage of germination of the seed lot as a whole.

In company tests, samples of wheat were treated first with mercury-free Panogen at a rate of ¾ oz. bu. and thereafter samples of the same seed lots were treated with regular Panogen at the same rate. A sample was taken every minute during 20 minutes. From each treated sample 1,000 seeds were taken out, and the samples divided into three groups: strongly colored; moderately colored; and weakly or not colored. Germination tests were made from each group by the standard method on filter paper and the results obtained are recorded in averages of the 20 samples taken.

Readers interested in further details of the test studies are referred to Panogen, Inc., New York.

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New 1951 Handbook

"Pesticide Handbook 1951," listing trade names, ingredients, uses and manufacturers of commercial pesticides is to be published early in 1951, according to Dr. Donald E. H. Frear, Pennsylvania State College, editor of the new publication. The book, which will contain approximately 200 pages, covers insecticides, fungicides, herbicides, rodenticides and application machinery.

For the past two years Dr. Frear, with Drs. A. L. Prince and M. T. Hilborn have compiled "Pest Control Materials," a bulletin published jointly by the Maine and Pennsylvania Agricultural Experiment Stations. The 1950 edition of this book contained information on more than 4,000 trade-named products manufactured by 300 companies.

All correspondence should be addressed to The Editor, "Pesticide Handbook," Box 798, State College, Pa.

Accepting public relations award for NFA, is William E. Chace, (left) director of publicity. Holding the trophy is Howard Bonham, chairman of the judges' committee which had reviewed the public relations work of the association.

NFA Gets New Honor

For the second time in as many months, the National Fertilizer Association, Washington, D. C. has received high honors for its over-all public relations program. On November 14, NFA was presented with the 1950 top award in the field of agriculture by the American Public Relations Association. The award was made in Washington as a feature of the A.P.R. Association's annual meeting in the capital.

The trophy was presented by Howard Bonham, vice president of the American Red Cross and chairman of the Judges Committee of the group. In making the presentation, Mr. Bonham stated that the award was being given for an "unusually comprehensive program with a large element of public service and a striking use of graphic material. The broad program has been based mainly on educational assistance to farmers, organizations and schools with all phases well integrated to give the greatest amount of good will."

Accepting the trophy for NFA was William E. Chace, director of publicity, who stayed in Washington to attend the ceremony while other members of the staff were at the Association's fall meeting at Edgewater Park. The previous award was presented in September, at which time an award of merit was given the NFA by the American Trade Association Executives at their annual meeting in Boston.

New Barrett Salesmen

The Barrett Division, Allied Chemical & Dye Corporation has announced that Walter S. Colvin has been appointed sales manager, Direct Application Materials, Midwestern District, with headquarters at South Point, Ohio. Direct Application Materials include "Arcadian," the American Nitrate of Soda, "A-N-L" brand fertilizer compound and other nitrogen fertilizer materials distributed by Barrett for direct application.

Clifford Camp, sales manager, Direct Application Materials, Southern District, will continue to be located at Columbia, South Carolina, and Borden S. Chronister, Chief Agronomist, Southern District now has headquarters at Barrett's new office in Richmond, Va. Mr. Chronister was formerly located at Hopewell, Va.

C. A. Graft is now devoting his entire time to sales and service work on Fertilizer Manufacture Materials, including Nitrogen Solutions, Anhydrous Ammonia and Sulphate of Ammonia in New England, New Jersey, New York and Pennsylvania. P. V. Whiting, a new Barrett representative, is taking over sales of "Arcadian," the American Nitrate of Soda and "A-N-L" brand fertilizer Compound in this same territory.

Jack F. Dulaney, a new representative, will handle sales and service on fertilizer manufacture materials in Alabama, Mississippi and western Tennessee. Mr. Dulaney will be located at Montgomery, Alabama.

Officers and Directors, California Fertilizer Assn.

Seated left to right: Paul Pauly, retiring secretary, Grover Dunford, retiring treasurer, Wallace Macfarlane, director (Pacific Guano Co., L.A.)

Sitting on arms of davenport: Charles Monoogian, director (Downey Fertilizer Co.,) R. J. Crum, director (Pacific Guano Co., Berkeley.)

Standing: Elmer E. Nelson, Mgr. C.F.A., S. B. Totem, director (Swift & Co., Los Angeles), James Quinn, president and director (Calif.-Sun Fertilizer Co.) B. H. Jones, director (Sunland Industries, Fresno), Lowell Berry, director (Best Fertilizers Co., Oakland), Ned Lewis, director (Wilbur-Ellis Co., L.A.), Earl Mog, director (Growers Fertilizer Co. (Complete report of meeting, page 51)

LISTENING POST

(Continued from Page 67)

the results from these materials and the corresponding check are not comparable with results from the other treatments. L-224 is a zinc mercury chromate complex that has shown promise as a corn seed treatment. No. 640, a zinc-copper-chromate complex, and No. 5400, a "reaction product of dimethyl dithio carbamate and sulfur dichloride," while less widely tested than L-224, have been found by some investigators to be beneficial as seed treatments for corn and some vegetables.

Table 1.
Emergence from treated and untreated seed of Texas Blackhull kafir and Leoti sorgo at 20° and 25° C., planted in non-sterilized soil one week after treatment; and the percent of heads infected with covered smut in field plots planted one month after treatment at Plant Industry Station, Maryland, 1950.

Seed Treatment[a]		Emergence from seed of[b] Kafir		Leoti		Total and smutted heads in[c] Kafir		Leoti	
Fungicide	Rate per bu.	20°C	25°C	20°C	25°C	Total	Smutted	Total	Smutted
	Oz.	%	%	%	%	No.	%	No.	%
Untreated	.....	69	85	57	65	320	43	155	44
Anticarie	1	73	85	64	65	320	25	115	18
Arasan	2	76	91	60	67	375	0	120	0
Copper carbonate	2	77	88	67	70	330	0	145	0
Phygon	2	73	88	65	66	310	0	155	0
Spergon	2	77	88	57	66	300	0	175	0
Aagrano 48	2	67	86	79	69	330	0	160	0
Aagrano 250	1	66	94	62	65	280	0	195	0
Ceresan M	½	70	91	57	58	280	0	140	0
Dynacide	1	73	92	67	65	290	0	160	0
Untreated	.....	69	85	57	65	300	38	96	23
Mercuran A.S.	½	86	85	71	68	406	0	84	0
Semenon	2	80	91	73	67	330	0	143	0
Arasan (slurry)	1½	79	91	70	70	305	0	110	0
Phygon (slurry)	2	76	86	68	73	312	0	100	0
Ceresan M (slurry)	½	65	88	60	70	280	0	140	0
Mercuran A.L.[d]	½	69	87	59	65	340	1.5	64	8
Panogen [d]	¾	64	88	71	68	310	0	105	0
Panogen[d]	1	67	86	61	74	310	0	125	0
Panogen[d]	1¼	65	84	65	65	215	0	245	0
Untreated	.....	75	84	.....	.....	134	50	.....	.....
C and C L-224	2	85	84	.....	.....	150	0	.....	.....
C and C No. 640	2	85	86	.....	.....	155	0	.....	.....
C and C No. 5400	2	82	86	.....	.....	200	0	.....	.....

[a]All treatments were applied as dusts unless indicated otherwise.
[b]Underscored figures indicate significant difference compared with check.
[c]Extremely poor stands in some rows were due to poor drainage and weeds.
[d]Applied by the "quick wet" method.

NDAC Course on Fertilizer

The second annual short course for North Dakota fertilizer dealers was held December 6th at the North Dakota Agricultural College. Instruction was provided by staff members of the Experiment Station and Extension Service.

The place of commercial fertilizers in soil management was discussed by Dr. G. A. Johnsgard; commercial fertilizers by Dr. J. C. Zubriski; and mechanical problems involved in applying commercial fertilizer by S. L. Vogel. Results secured in fertilizer experiments and farm demonstrations were presented by Dr. E. B. Norum and Dr. R. B. Widdifield. Recommendations for the use of fertilizers in 1951 were presented.

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Thomas to Int. Minerals

Dr. R. P. Thomas has been appointed manager of the technical service department of the Plant Food Division of International Minerals & Chemical Corporation, according to Maurice H. Lockwood, vice president

R. P. THOMAS

in charge of the division. Dr. Thomas, formerly professor of soils at the University of Maryland, has been on a temporary assignment with International during recent months assisting in market survey studies. In his new capacity he will work with the other departments of the Plant Food Division in the utilization of scientific and research developments in fertilizer manufacture and use.

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Auchter to Hawaii

Dr. T. C. Auchter, Director of the Pineapple Research Institute of Hawaii, has announced the appointment of Dr. Lawrence Parks of Shelbyville, Tenn., as associate soil scientist at the Institute. Dr. Parks was to arrive in Honolulu about the middle of December to do research work in the field of soil chemistry under the direction of Dr. M. D. Thorne, head of the Institute's Soils Department.

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Purcell Leaves Prentiss

John W. Purcell, a vice-president of the Prentiss Drug & Chemical Co., New York, formerly R. J. Prentiss & Co., resigned as of December 1. He has been associated with the firm for fifteen years in sales. Although it is understood that his future plans call for business operations on his own account, he has not as yet made any definite announcement.

PHYTOPATHS

(*Continued from Page 77*)

may follow their path down to the most remote points.

In conclusion, Dr. Jensen pointed out that use of the atom in research may help answer questions asked by the Food and Drug Administration and others regarding what happens to foods in the human body.

Dr. George L. McNew recalled the painstaking job which has been done to gather data to present at the FDA hearing. He reported that the data revealed a total of 68 major diseases that must be controlled, and some 72 fungicidal compounds needed to affect this control. These 72 compounds represent the recommendations of 196 plant pathologists who had tested 215 fungicides.

A brief paper covering the supply of sulfur was prepared by Dr. P. D. Peterson, Stauffer Chemical Co., New York, but read in his absence by Dr. F. L. Howard, Kingston, R. I., co-chairman of the colloquium. The paper emphasized that the supply of sulfur is not unlimited; that 1950 will probably be the year of peak production of 5,200,000 tons, while 1951 may see a drop to perhaps 4,900,000 tons. This is compared to a constantly increasing demand for the material. The information was summarized by the comment that shortages will probably total 20% and that "somebody is going to suffer" because of this.

Dr. W. D. McClellan, U.S.D.A., Beltsville, Md. reported on the function of the Fungicide Committee, explaining in considerable detail how it gathers and assembles data, and summarizes it into reports on a wide variety of fungicidal products.

Dr. C. H. Arndt presented data on the cooperative fungicide tests, remarking that there are not so many new ones of late. He did mention, however, that there is a need for standard techniques for measuring the effectiveness of seed protectants.

New Products

AS has been the custom for a number of years, the colloquium invited industry representatives to introduce new fungicidal materials. Six persons responded. Dr. John Harry, Carbide & Carbon Chemicals Div., Union Carbide & Carbon Corp., New York, presented data on two experimental chemotherapeutants, 4-chloro-3,5-dimethylphenoxy ethanol, with a code number of 1182; and 2-norcamphanemethanol, known as 1207. "Laboratory and commercial greenhouse tests conducted in connection with the Connecticut Agricultural Experiment Station," he said, "indicate that 1182 and 1207 are effective internal toxicants for certain systemic diseases of plants." Among these were listed the vascular wilts of carnation and tomato and virus "X" of peaches. Research quantities of the two materials are available only for preliminary testing, and are not for sale.

Sylvan Cohen, representing Gallowhur Chemical Co., announced that the fungicide "Puratized Agri-

cultural Spray" would be sold with a slightly changed formula in 1951. He said that the active ingredient would be increased from 5.0% to 7.5%, but this would not affect the safety factor.

Carl Condron, speaking for California Spray Chemical Div., Elizabeth, N. J., described the product, "Orthocide 406," developed by Standard Oil Co. and formerly known as "SR-406." The fungicide is useful on widely separated diseases, and is safe on a large number of crops, he said. It was developed at Rutgers University after four years of experimental work. It is made as a 50% wettable powder formulation. The material will be available to research scientists in 1951, Mr. Condron reported.

Joseph Marzak, Mallinckrodt Chemical Co. presented a new turf fungicide which will be marketed under the trade name of "Calo-Cure." The material will be available for experimental work only, in 1951, he said.

A new experimental seed protectant and agricultural fungicide was introduced by R. T. Vanderbilt Co., Inc., New York. The material, known as "Vancide 51," has shown promise in field and indoor trials during the 1950 growing season, and samples are now ready for further tests and evaluation. The company findings reported thus far have indicated the product is toxic to causative organisms; that it neutralizes the toxin produced by the organisms and that host plants are not injured by it in the effective range of concentration.

Gordon Brandes, representing Rohm & Haas Co., Philadelphia, reported that the products "Dithane" and "Parzate" may have chemotherapeutic possibilities, judging from tests made during 1950. He reported that tests made recently have shown promise of this type of action.

Dr. Duggar Honored

As the featured event of the banquet program Saturday night, the APS presented to Dr. B. M. Duggar, noted scientist and discoverer of Aureomycin, a bound volume of testimonial letters from former students and fellow scientists in the Society. Dr. Tucker, APS president, read a biography of Dr. Duggar's scientific achievements over a period of more than 60 years, and Dr. H. C. Young, Ohio Agricultural Experiment Station, Wooster, Ohio, recalled Dr. Duggar's days at the Henry Shaw School of Botany, Washington University, St. Louis, Mo. J. C. Walker, University of Wisconsin, told about Dr. Duggar's work at that school; and Paul E. Tilford, executive secretary, National Arborists Association, Wooster, Ohio, made the presentation of the bound testimonials for the APS.

Dr. Duggar, in responding to the honor, expressed deep appreciation to the society for its thoughtfulness, and indicated that he intends to continue doing research in the future.

Running concurrently with the fungicide colloquium was a round table discussion on whether or not the Plant Disease Survey should revive

its crop loss estimates. Dr. Paul R. Miller, U.S.D.A., Beltsville, Md., was chairman of the session. Four leaders took part in the discussion. They were Drs. W. D. Valleau, Lexington, Ky., former APS president; E. A. Andrews, Michigan Agricultural Experiment Station plant pathologist; K. Starr Chester, Battelle Memorial Institute, Columbus, Ohio; and Dr. George L. McNew, Boyce Thompson Institute, Yonkers, N. Y. The general sentiment was strongly in favor of a continuation of the crop loss estimates, particularly in view of the war situation and the need for definite figures of losses.

A registration of 415 was counted, to make the Memphis meeting one of the largest held in recent years by the APS. Meeting in conjunction with the Phytopaths was the Society's Southern Division and the Potato Association of America which held a joint session with the APS Sunday afternoon.

TESTIMONY

(Continued from Page 74)

is also authority in the law to establish tolerance on all other products. As a part of this authority the administrator can prohibit the use of any product which he feels is unsafe in or on food."

Speaking on the proposal to make a "new drug section" of the existing Food, Drug and Cosmetic Act," he said there is no simple cure for the problem. "It is impossible to regulate the drug industry, the use of chemicals in or on foods, the pesticide industry, the fertilizer industry and possibly others, by a single statute which fails to recognize the individual problems of each."

In his appearance before the committee, testifying as a representative of the Manufacturing Chemists' Assn., Dr. John Fougler, a medical doctor associated with E. I. du Pont de Nemours & Co., Wilmington, pointed out that the farmer's fight against insects is being won with one weapon — insecticides. The decision not to use chemicals in or on food may thus be a greater hazard to public health and welfare than the decision to use it, Dr. Fougler stated. His testimony was supported by that of Dr. Norman A. Shepard, a research executive of American Cyanamid Co.; Dr. H. C. Spencer, toxicologist for Dow Chemical Co., and James M. Gillet, a chemical engineer for Victor Chemical Works.

Dr. Fougler also pointed out that in the 12 years since the new Food and Drug Law was enacted, the Food and Drug Administration has issued only one order under the seizure and condemnation provision—that limiting the amount of fluoride residues that may be tolerated on certain fresh fruits.

The bulk of Dr. Fougler's testimony dealt with the use of food chemicals and chemicals in food. In consideration of any new law he recommended particularly that consideration be given to scientific facts involved and to the disadvantages as well as advantages to the public.

St. Regis Names Taylor

St. Regis Paper Company has announced the appointment of James W. Taylor as assistant manager of the Southeastern Sales district of the company's Multiwall Bag Division. The appointment became effective November 1. Mr. Taylor's office is located at Baltimore, where he has been associated with the sales district for more than four years. He joined St. Regis in the New York office headquarters in October, 1945.

FERTILIZERS SANS H_2SO_4

(Continued from Page 55)

phosphate and ammonium nitrate. This method has been developed into working processes in Europe. Although commercial production has not taken form in this country, a wide interest in such processes has been manifest for sometime and considerable development work on the dicalcium phosphate-ammonium nitrate processes has been done recently by the Tennessee Valley Authority.

In all forms of the method the composition of the nitric acid extract of the rock must be adjusted by one means or another from a CaCO to P_2O_5 mole raito of 2, or less, prior to ammoniation. In one procedure (*10*) adjustment is made by "freezing out" calcium nitrate, which then appears as a by-product. The principal product, a typical grade being a 20-20-0 mixture, is obtained by drying the ammoniated slurry. In another process the adjustment is accomplished by the addition of phosphoric acid, which in practice amounts to treatment of the rock with a mixture of nitric and phosphoric acids. The dried product contains, besides dicalcium phosphate and ammonium nitrate, more or less ammonium phosphate, the amount of which is governed by the initial proportion of phosphoric acid. With the addition of potassium chloride prior to drying, a complete mixed fertilizer may be obtained as was done in Germany about 1930 (*8*). In mixed acid treatment sulfuric acid can be used in place of phosphoric acid to produce a material similar to ammoniated ordinary superphosphate plus added ammonium nitrate with a 50 percent saving in sulfuric acid. This process is used in France to produce 10-10-20 fertilizer (*11*).

Thermal Defluorination

AVAILABLE phosphates in the form of defluorinated phosphate are prepared by heating silica-bearing phosphate rock, either with or without additives, in a flowing atmosphere of steam at 1200° C., or higher. Three processes are in operation in as many domestic plants.

Fusion Process.—This process is used in the Tennessee Valley Authority's plant (*7*). The product, fused tricalcium phosphate, is used as a fertilizer. Briquetted phosphate sand (18-23% SiO_2 and 8-10% R_2O_3) is heated at about 1400° C. in an oil-fired shaft furnace. The melt flows downward to the hearth in shallow streams countercurrent to rising water-laden combustion gases, which provides intimate contact between a constantly renewed surface and the water vapor. The molten product accumulates on the hearth and is periodically tapped into high-velocity

jects of water in a quenching trough. The product is dried and ground in a hammer mill.

Calcination Process. — The Coronet Phosphate Company accomplishes defluorination in oil fired rotary kilns without substantial melting of the furnace charge (*14*). The product is used in animal feed. The material is retained in the hot zone for 20 to 30 minutes at 1480 to 1590° C. with temperature control to prevent excessive fusion. The product, which resembles cement clinker, is ground in a roller mill before shipment. Formerly, the furnace feed was a blend of finely-ground phosphate rock and about 40 percent of sand (Cristobalite process), whereas now high-grade rock with relatively small amounts of additive is used.

Beta Tricalcium Phosphate Process.—International Minerals and Chemical Corporation produces defluorinated phosphate by calcining a blend ($CaO:P_2O_5$ about 3) of phosphate rock and phosphoric acid at about 1200° C. in oil-fired rotary kilns (*2*). The product is used in animal feed. For fertilizer production a higher temperature would be desirable, in order to produce the more soluble high-temperature modification of tricalcium phosphate.

Calcination

CALCINATION of phosphate rock with sodium carbonate and silica is the basis of the Rhenania process used in Germany (*6*). The moistened furnace feed, consisting of finely-ground phosphate rock, sand to raise silica content to 10 percent and 1 part of soda ash to 4 parts of rock, is heated to 1100 to 1200° C. in a rotary kiln. Passage through the kiln requires about 2 hours. The clinker is ground rather fine for fertilizer use.

A similar process using a potassium salt was operated in the United States several years ago (*1*).

Fusion

WITHIN the past five years basic phosphate glass has been produced at two locations on the west coast by fusing proportional mixtures of phosphate rock and serpentine or olivine in electric arc furnaces (*9*). Soon after World War II a product of this kind was produced by Permanente Metals Corporation at Permanente, California, with the use of calcined serpentine, and more recently a plant was constructed by Manganese Products, Inc., at Seattle, Washington, for the production of a similar product with the use of olivine. The raw materials had best be dried in either case, but pre-calcination of serpentine is a necessity. The operating temperature is about 1550° C., and the molten product is tapped from the furnace and quenched with water in the same manner as defluorinated phosphate in the fusion process. The quenched product must be a glass; otherwise, its fertilizer value may be no greater than that of the untreated phosphate rock.

(1) Anonymous, Kreiss Potassium Phosphate Co. Makes an All-American Fertilizer. Fertilizer Green Book, 8, No. 4, 21 (1927).

(2) Butt, Manufacture of Defluorinated Tricalcium Phosphate. U. S. Patent

2,442,969 (June 1948).
(3) Copson et al, Development of Processes for Metaphosphate Production. Ind. Eng. Chem., 34, 26 (1942).
(4) Easterwood, Manufacture of Phosphoric Acid by the Blast Furnace Method. Am. Inst. Chem. Eng. Trans., 29, 1 (1933).
(5) Fox and Clark, The Chlorophosphate Process for Dicalcium Phosphate. Ind. Eng. Chem., 35, 1264 (1943).
(6) Hawes and Lea, Kali-Chemie Rhenania Phosphat Werke, Brunsbüttelkoog. U. S. Dept. Com., Office of Technical Services, PB-18913, 19 p. (1945).
(7) Hignett and Hubbuch, Fused Tricalcium Phosphate: Production by Defluorination in a Shaft Furnace. Ind. Eng. Chem., 38, 12088 (1946).
(8) MacMullin, Fertilizers Made by I. G. Farbenindustrie A. G. at Leuna and Piesteritz. U. S. Dept. Com., Office of Technical Services, PB-44650, 57 p. (1946).
(9) Moulton, Electric Furnace Fertilizer: Ca-Mg-Phosphate. Chem. Engineering, 56, No. 7, 102 (1949).
(10) Netherland State Mines, Removing Calcium Nitrate from a Solution of Calcium Phosphate in Nitric Acid. Dutch Patent 62,998 (Apr. 1949).
(11) Quanquin, New Commercial Methods for Complex Fertilizers. L'Industrie Chemique, 34, No. 9, 165 (1947).
(12) Tennessee Valley Authority, Development of Processes and Equipment for Production of Phosphoric Acid. Chemical Engineering Report No. 2 (1948).
(13) ———, Development of Processes for Production of Concentrated Superphosphate. Chemical Engineering Report No. 5 (1949).
(14) Whitney and Hollingsworth, Production of Defluorinated Phosphate Rock-Calcining Without Fusion in Rotary Kilns. Ind.Eng. Chem., 41, 1325 (1949).

CALIF. FERTILIZER

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culture. "By integrating our activities with theirs we can better achieve a prosperous progressive agriculture in every community we serve. "Thus, by creating new outlets—for example, fertilization of pastures—by developing new products and by utilizing new crops, we create opportunities for increasing the use of fertilizers. "Ours also is the obligation to speed the obsolescence of old dusty types of mixed fertilizers, inefficient equipment and discredited sales policies."

How this policy of research has paid off in the fertilizer industry was pointd out by Dr. Sauchelli who reminded that before 1925, synthetic ammonia solution was unknown, and by 1949, more than a third of the nitrogen used in the formulation of mixed fertilizers came from this source. To illustrate the trend further, he stated that in 1900, nearly 90% of the nitrogen used by the fertilizer industry came from organic sources. Today, less than 5% is derived from organics. The case of potash was also reviewed, how the U. S. had moved from dependency upon a foreign source to a position of independence. The story of ammonium nitrate was also reviewed. "Before the recent war, ammonium nitrate was unknown in the fertilizer materials trade; last year over 300,000 tons were used for agricultural purposes, of which a considerable amount went into fertilizer formulations. Urea is another newcomer to the synthetic sources of nitrogen materials," he said.

To keep pace with technological developments in the industry, Dr. Sauchelli stated that the "essential job of merchandising our products"

must be equally well developed. "Are we as an industry taking the necessary steps to organize sales staffs for effective merchandising? he asked. Shouldn't we be training well-selected personnel to be service men, not order-takers, for the days ahead when technical knowledge will be a necessity?

As guest of honor at the luncheon on Thursday, Dr. Russell Coleman, president of the National Fertilizer Association, Washington, D. C. spoke on the topic, "Lost and Found." He pointed out that the history of man tells of his losing much due to his lack of moral responsibility, dating from Eden. On the other side of the ledger, he said, man has found how plants feed and what keeps them alive. Of the many important discoveries down through the ages, none has been so basic as that of finding how to produce more food for more people.

"There are still other problems remaining to be solved," he said. The fertilizer business is one of the cornerstones of civilization, because without this product, there can not be an adequate food supply, without which, there can be no industry. One of the problems is that of finding new supplies of plant food, and to acquire more knowledge about the soil and its products. This information should then be passed on to the farmer who benefits from science and research.

Supplies Discussed

FOUR persons took part in a panel to discuss the supply situation. They were: Wilson Meyer, Wilson and George Meyer Co. Pacific coast representatives for Norsk-Hydro; David Scott, American Potash & Chemical Co.; Reme Jones, Anaconda Mining Co.; and F. H. Leavitt, Shell Chemical Co., San Francisco.

Mr. Scott predicted that the 1950-51 consumption of potash in the western states will be about 10% greater than last year's 44,000 tons, but unless the demand becomes greater than indicated, he said, there should be enough potash to protect western agriculture. Mr. Jones added that "it appears that there may be sufficient supply of normal superphosphate available in 1951. At least, that was the situation in mid-October." He added that there will probably be additional plants built during the new year. Due to the shortage of sulfuric acid, manufacturers may have difficulties, even though there is sufficient plant capacity. Concentrated or triple superphosphate will be short next season, he predicted.

So far as nitrogen is concerned, Mr. Leavitt said there will be enough to go around, provided growers and dealers place orders in advance of need and accept delivery when the material is available. Mr. Meyer pointed out that Norway is the birthplace of production of air nitrogen, converted into synthetic liquid ammonia. Liquid ammonia combined with limestone produces calcium nitrate, he reminded. The Norsk-Hydro plant has doubled its production recently, in anticipation of U. S. demand, Mr. Meyer reported, and stated further that "there are now two sailings a

month of ships loaded with calcium nitrate from Norway to the Pacific Coast."

CFA president J. M. Quinn opened the first afternoon's session with a talk on "Building for the Future." His remarks were geared to the need for increased activities on the part of the Association for the strengthening of the fertilizer industry.

Allen B. Lemmon, chief of the California State Bureau of Chemistry, and Robert A. Rollins presented a "Report of the Year," and DeWitt Bishop, district inspector of the Bureau, talked on "Deficient Fertilizers, the Child of Errors."

Dr. Hans Jenny, Professor of Soils, University of California, Berkeley, presented a technical paper on "The Contact Theory of Mineral Nutrition of Plants in Soils." Explaining the theory, he said that it "provides an additional mechanism for nutrient uptake by roots. Its main feature rests on the fact that the root surface, like the clay surface, also possesses adsorbed or exchangeable ions. When the root surface and the clay surface come close together, the nutrients (ions) exchange places. For this reaction to occur, it is not necessary that the nutrients be dissolved,' they merely 'jump' from one surface to another. This new aspect throws interesting new light on the mineral nutrition of plants in soils."

A. H. Dill, A. B. Farquhar Co., described new precision placement machinery, and Dr. A. O. Lorenz, assistant professor of truck crops, U. of California, Davis, talked on "Placement of Dry and Liquid Fertilizers."

A cocktail part on Thursday evening was given by Balfour, Guthrie & Co., Los Angeles, followed by the annual Association dinner-dance. Entertainment and recreation was under the direction of Tom Lathe, Wilson & George Meyer Co. Mrs. Norman Springer was chairman of the Women's Committee. Elmer S. Nelson, executive secretary and manager of the Association, assisted by Margaret Maher, secretary, supervised arrangements for the convention.

Ithaca Conference Attracts 340 in Nov.

THE Twelfth Annual New York State Insecticide and Fungicide Conference and the Third Annual Pesticide Application Equipment Conference was held at Bibbins Hall, Cooperative G. L. F. Exchange, Ithaca, New York, November 14, 15 and 16. These conferences, sponsored jointly by the Departments of Plant Pathology, Agricultural Engineering and Entomology at Ithaca and the Divisions of Entomology and Plant Pathology at Geneva, afford an opportunity for members of industry, the college and experiment station, and others interested in pesticidal chemicals to hear the reports of progress in research and recommendations for insect and disease control for the coming year, as well as the highlights of the research program dealing with the development and evaluation of pesticide application equipment. Of a total registration of 340 during the three day meeting, 193 representatives came from industry, 127 from colleges and experiment stations, 38 from Canada, and others attending were from Holland, South Africa, Great Britain, U. S. D. A., and the New York State Dept. of Agriculture.

The program of the Pesticide Application Equipment Conference on November 14 opened with an address of welcome by Dr. T. P. Wright, Vice President for Research, Cornell University, who described the broad program of research being conducted by the University in its various colleges. Members of the Geneva and Ithaca staffs of Cornell University reviewed progress in research during the 1950 season with concentrate and low gallonage equipment used on fruit and row crops. Formulations for use in the equipment were discussed. A demonstration of the experimental machines in use during the season was held at the close of the afternoon program. Featuring the evening program were invitation papers by Mr. Earl D. Anderson of the National Sprayer and Duster Association, Chicago, on the subject of "Modern Small Sprayers and Dusters," and a talk "Application of Concentrates on Fruit Trees" by Dr. Fred Lewis and Mr. Dean Asquith of Pennsylvania State College.

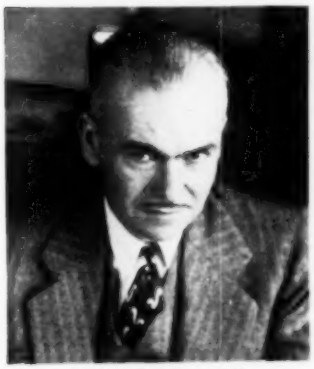
The two day program dealing with insecticides and fungicides opened with two guest speakers, L. S. Hitchner, Executive Secretary, National Agricultural Chemicals Association, Washington, D. C., and Dr. Joseph A. Evans, Grasselli Chemicals Dept., E. I. duPont de Nemours & Co., Wilmington. Mr. Hitchner, speaking on supply outlook for agricultural pesticides in 1951 urged farmers to place their orders early with their established dealers and accept delivery when materials are available. Every effort is being made by industry and government, Mr. Hitchner said, to assure an adequate supply of fungicides and insecticides.

Dr. Evans reviewed the high points of new pesticidal chemicals for the 1950 season. He stressed the continued need for a cooperative approach between industry and government workers in developing and evaluating the large number of new chemicals that are being developed for pest control. Within the past few years, Dr. Evans pointed out, more new and effective materials have been developed and used in agriculture than formerly might have appeared in a generation. This rapid progress requires constant cooperation and will insure a bright future for the use of agricultural pesticides.

Members of the Ithaca and Geneva staffs of Cornell University reviewed the highlights of the research of the 1950 season with diseases and insect pests affecting fruit, vegetables, florist and nursery crops, and members of the extension staff gave the control recommendations for their respective fields for the 1951 season. Included on the program was a review of the cooperative research project on the cost of spraying apples, insect control on forage crops, livestock insect control and housefly resistance to insecticides.

Gemmell With Geigy Co.

Louis G. Gemmell has joined the technical staff of Geigy, Inc., New York, the company states. He will



Louis G. Gemmell

be located at the Bayonne Research Laboratory. Formerly associated with the Insecticide Division of the Sherwin-Williams Company and American Cyanamid Company, his new work will be in the field of technical sales promotion for the broadening list of Geigy insecticides, fungicides and weed killers. His responsibilities will include labelling, legislation and sales promotion in the field with the staff of Geigy sales representatives.

EASTERN AAEE

(*Continued from Page 61*)

Field experiments conducted during the seasons of 1949 and 1950 in prune orchards comparing lead arsenate and certain organic insecticides for control of plum curculio. Lead arsenate, used at the rate of 2.5 pounds to 100 gallons, did not give satisfactory control of the plum curculio. Benzene hexachloride, used at the rate of 0.25 pound of the gamma isomer to 100 gallons gave excellent control. This material was quite toxic to the immature stages but was of little value against the adults. Three applications of parathion at a concentration of 0.25 pound to 100 gallons gave excellent control of plum curculio. This insecticide gave a high initial kill of the adults but was less toxic to the immature stages than benzene hexachloride. Tests for one season indicate that ethyl p-nitrophenyl (EPN-300) thionobenzenephosphonate, used at the rate of 0.27 pound to 100 gallons, will give satisfactory control of plum curculio. This compound gave a high initial kill of the adults and the residual effect lasted from 4 to 6 days. It was less toxic to the immature stages than parathion and benzene hexachloride. Experiments indicate that three applications of dialkyl nitroaryl thiophosphates ("Metacide") are quite effective for control of plum curculio.

This material gave a high initial kill of the adults but under field conditions the residual acitivity was of short duration. This insecticide appears to be quite effective for the immature stages of plum curculio. No injury to the fruit or foliage of prunes has been observed where sprays of benzene hexachloride, lindane, parathion, ethyl p-nitrophenyl thionobenzenephosphonate were used. Three applications of dialkyl thiophosphates injured the fruit of prunes.

J. Alfred Adams of the New York State Agricultural Experiment Station, Poughkeepsie, N. Y., reported on "Tests With Dieldrin For Control of Japanese-beetle Larvae in Turf."

Dieldrin was applied dry on turf plots. The turf was made up mostly of wild oatgrass and weeds and was considered unusually resistant to penetration by rain. The soil was a poorly drained, compact gravelly loam. In plots treated at 2.7 pounds of toxicant to the acre on August 30, 1949, there were indications of about 50% mortality of Japanese-bettle larvae by November. By the time of pupation of that generation, in late June 1950, the control was about 85%. In plots treated at 5.4 pounds per acre in November 1949, the control by late June 1950 was also about 85%. In a plot treated at 10.8 pounds to the acre in November 1949, control was not yet complete by June 1950. In all the plots mentioned, control by October 1950 was 100%. The test indicates that although dieldrin may be impeded in its penetration of tight sod on compact soil, its persistence after application makes it a promising insecticide for turf grubs.

In his report on "Field Experiments for Control of the Oriental Fruit Moth", M. L. Bobb, Piedmont Fruit Research Lab., Charlottesville Va., indicated that DDT, EPN and parathion were found effective in controlling this pest, but that parathion had a short residual life in comparison with the other two insecticides. Chlordane, aldrin, dieldrin, benzene hexachloride, methoxychlor, and lead arsenate were not effective insecticides for control of the oriental fruit moth.

Tests indicated that one spray application applied at the peak of moth flight for the first and second broods of the oriental fruit moth is more effective than similar sprays appiled for control of the second and third broods, and equally as effective as sprays applied for control of the first, second and third broods.

Resolution to Delaney

Among the resolutions adopted by the group was one dealing with restrictive regulations applied to the industry. It read in part as follows: "whereas the need for various types of effective insecticides is most urgent in order to secure and maintain a high level of production of good quality food, feed and fiber to meet domestic and world needs, be it resolved that the Eastern Branch of the American Association of Economic Entomologists believes that, on the whole, existing regulations and procedures now being followed in the development of more effective insecticides and in the control of their use, constitute adequate protection of the health and best interests of the public".

A copy of the resolution was to be sent to the Hon. James J. Delaney, chairman of the Select Committee to Investigate the Use of Chemicals in Food Products, and one to the Secretary of Agriculture. Serving on the resolutions committee were Ellsworth H. Wheeler, E. N. Cory and D. L. Collins.

Southern Mfgrs. Meet

Farm equipment manufacturers from ten Southeastern states met in Atlanta, November 17 and 18 to form the manufacturers organization known as Southern Farm Equipment Manufacturers, Inc. John T. Cash, Knox Metal Products, Inc., Thomson, Ga., was elected president.

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Ins. Fung. Dealers Meet

The seventh annual conference of insecticide and fungicide dealers was held November 30th, at the College of Agriculture, Rutgers Univ., New Brunswick, N. J. Dr. C. C. Alexander, Geigy Co., New York, representing the National Agricultural Chemicals Association, pointed out that the industry is anxious for every farmer to get the materials he needs next season, and that early orders will give manufacturers some indication of next year's requirements. Already production difficulties are showing up because of limited supplies of some raw materials, including chlorine, benzene, alcohol, copper and lead.

Dr. Bailey B. Pepper, Rutgers Univ., said that dealers should be in a position to advise farmers how they can get results by using substitute insecticides. The use of new insecticides and particularly a practical approach to their application was stressed by Peter J. McManus, Grange League Federation, Ithaca, New York. Mr. McManus stated that research results too often show the favorable attributes of new insecticides and ignore their limitations.

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Entomology Research Fund

The Thomas J. Headlee Research Fellowship in Entomology at Rutgers University, has recently enlisted five new companies in its support. Donations from these firms, together with interest and other accruals, have stepped up the principal of the fellowship to $32,000.

Additions during the last year to the 24 concerns enrolled previously are: Boyle Midway Inc.; Cranford; California Packing Corp., Swedesboro; S. B. Penick & Co., Jersey City; Velsicol Corp., Chicago; and Geigy Co., New York.

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Southwest AAEE Meeting

The first annual meeting of the Southwestern branch of the American Association of Economic Entomologists will be held March 1st and 2nd, 1951, at the Adolphus Hotel, Dallas, Texas. P. J. Reno, Hercules Powder Co., Dallas, is chairman of the local committe on arrangements.

John H. Germain Dies

John H. Germain, retired sales manager of F. W. Tunnel & Co., manufacturers of fertilizers, died Nov. 27, at his home in Drexel Hill, Pa.

AMA COMMITTEE

(*Continued from Page 31*)

will be reproduced in other informational media with which we are not immediately acquainted.

The Committee's forthright approach to certain basic problems of pesticide development and usage should contribute to an improved public attitude towards pesticides. It is believed that it will also result in a greater recognition of the contributions which your industry is making to agriculture and the public welfare.

Education Imperative

THE most logical and immediately productive means to encourage the judicious use of pesticides lies in educational methods. This concept has been emphasized and reemphasized in our meetings with leaders in the pesticide industry. Fortunately, the Committee has ready access to several information outlets. These are embodied in the publications of the American Medical Association and those of other organizations which follow the Association's leadership in health affairs.

The Committee is cognizant of the educational opportunities which these scientific periodicals offer and it is taking full advantage of them. For physicians and others who have a like interest, it is sponsoring a series of medical reports on the pharmacology and toxicology of the common potsons. The first in this series has been published in the *Journal of the American Medical Association*.[3] A second report is presently awaiting publication. Several others have been drafted and are currently under consideration. A series of a more comprehensive nature is also being prepared. These latter will review the significant facts on pesticides presenting the digested information in mimeograph form. They are ultimately intended for inclusion in a Committee manual on Pesticides.

3. Report of Committee on Pesticides: Pharmacology and Toxicology of Certain Organic Phosphorous Insecticides. (JAMA: *144*, 104, Sept. 9, 1950).

DILUENTS

(*Continued from Page 48*)

taining Inert Granular Residues. *Jour. Econ. Ent.* 35:348-50.

HORSFALL, J. G., G. E. R. HERVEY and R. F. SUIT, 1939. Dwarfing of Cucurbits sprayed with Bordeaux Mixture. *Jour. Agr. Res.* 58:911-28.

HUNT, C. R., 1947. Toxicity of Insecticide Dust Diluents and Carriers to Larvae of the Mexican Bean Beetle. *Journ. Econ. Ent.* 40:215-9.

JANES, R. L. and H. F. WILSON, 1944. Dispersants for Rotenone. *Soap* (9) 20:107-11.

MARSHALL, J., 1939. The Hydrogen Ion Concentration of the Digestive Fluids and Blood of the Codling Moth Larva. *Jour. Econ. Ent.* 32:838-43.

McDANIEL, E. L., 1937. White Coating on Foliage a repellant for Potato Leafhopper. *Jour. Econ. Ent.* 30:454-7.

MELVIN, R., 1948. Effect of Dusts on the Performance of Tetraethyl Pyrophosphate. *Jour. Econ. Ent.* 41:903-4.

MILLER, P. W. and W. B. BOLLEN, 1946. Walnut Bacteriosis and its Control. *Oregon Agr. Exp. Sta. Tech. Bul.* 9:91.

MORETTI, L. R., 1947. Non-Metallic Minerals used in the Insecticide Industry. *Non Metallic Minerals Conf.* P.C.E.

NIKITIN, A. A. and E. G. ANDERSON, 1942. Studies on the Performance of

Fungicide Diluents, Their Base Exchange and Copper Adsorption Capacities. *Phytopath.* 32:13.

PARFENTJEV, J. A., 1929. Researches in Insect Toxicology. Fourth Intern. Congr. Ent., Ithaca, N. Y. 1928:857-64.

PLANK, H. K., 1946. The Control of Storage Insects in Corl. *Jour. Econ. Ent.* 39:314-19.

POTTS, S. F., 1946. Particle Size of of Insecticides and its Relation to Application, Distribution and Deposit. *Jour. Econ. Ent.* 39:716-20.

RICHARDSON, C. H. and L. H. GLOVER, 1932. Some Effects of certain "inert" and Toxic Substances upon the 12-Spotted Cucumber Beetle. *Jour. Econ Ent.* 25:1176-81.

ROBINSON, R. H., and B. HATCH, 1944. Rotenone Dusts and Sprays. *Soap* (4) 20:125-31.

SMITH, R. H., 1928. An Investigation of Spray Coverage and Arsenical Residues in Relation to the Control of Codling Moth. *Jour. Econ. Ent.* 21:871-88.

TURNER, N., 1943. The Effect of Diluents on the Toxicity of Pure Ground Derris Root in Dusts. *Journ. Econ. Ent.* 36:266-72.

TURNER, N. and N. WOODRUFF, 1948. Toxicity of DDT Residues. *Conn. Agri. Exp. Sta. Bul.* 524.

WALKER, H. G. and L. D. ANDERSON, 1939. Control of Truck Crop Aphids. *Jour. Econ. Ent.* 32:498-505.

WATKINS, T. C., and L. B. NORTON, 1947. A Classification of Insecticide Dust Diluents and Carriers. *Jour. Econ. Ent.* 40:211-4.

WHEELER, W. M., 1913. Ants, Their Structure, Development and Behavior. *Columbia Univ. Biol. Series* 9:1-663.

WIGGLESWORTH, V. B., 1945. Transpiration Through the Cuticle of Insects. *Jour. Expt. Biol.* 21:97-114.

CONGRESSIONAL HEARING

EDITORIAL

(Continued from Page 29)

in December, Mr. Hitchner was asked why there was little or no interest by the farm groups in this question!

The proposed legislation presents a very difficult problem; there are a number of danger signs which the Congressmen concerned should heed carefully. First, if the use of pest control chemicals is seriously abridged, it may be impossible to grow food and fiber crops needed in our present mobilization program. Second, the new legislative proposals involve duplicating and perhaps conflicting control, with authority divided between the United States Department of Agriculture and the Food and Drug Administration. Such a situation would almost inevitably ham-string the pesticide industry, and with it the farmers and growers of the nation. If new controls are needed, there is no need to have them in hands other than those of the Agriculture Department.

WILSON, H. F., E. J. CAMPAU and R. L. JANES, 1944. The Effect of Plant Dispersants on the Toxicity of Rotenone in Ground Cube when Used for Pea Aphid Control. *Soap* (10) 20:121.

WILSON, H. F., C. E. DIETER and H. L. BURDICK, 1941. Insecticidal Dusts: A Study of the Effect on Mortality of Electrostatic Charges Produced by Friction in Applying Insecticides. *Soap* 17:99-101.

WILSON, H. F. and M. L. JACKSON, 1946. Effect of Mineral Composition and Particle Size of Dispersants on Toxicity of Rotenone dusts. *Jour. Econ. Ent.* 39:290-5.

WILSON, H. F. and R. L. JANES, 1942b. Carriers of Rotenone Dusts. *Soap* 18:103-5.

WILSON, J. D. and F. IRONS, 1942. Specifications of Some of the Insecticide Ingredients commonly used in Fungicidal Dust Mixtures. *Ohio Agri. Exp. Sta. Bimonthly Bul.* 27 (No. 214):26-42.

WILSON, J. D. and M. A. VOGEL, 1941. Density and Flowability of Insecticidal and Fungicidal dusts and dust Ingredients. *Ohio. Agr. Exp. Sta. Bimonthly Bul.* 26 (No. 209):69-78.

WILSON, J. D. and H. A. RUNNELS, 1937. The Effect of Various Spray Materials on Tomato Transplants. *Ohio Agr. Exp. Sta. Bimonthly Bul.* 22 (No. 185): 58-64.

WOGLUM, R. S. and H. C. LEWIS, 1940. Whitewash to control Potato Leafhopper on Citrus. *Jour. Econ. Ent.* 33:83-5.

WOODRUFF, N. and N. TURNER, 1949. Effect of Dispersing and Spreading Agents on Toxicity of DDT Spray Powders. *Jour. Econ. Ent.* 42:243-8.

WOODRUFF, N. and N. TURNER, 1949. Concentrated DDT Spray Powders. *Jour. Econ. Ent.* 42:249-53.

ZACHER, F. and KUNIKE, 1930. Untersuchungen über die insektizide wirkung von oxyden and karbonaten. *Arb. Reichsanst, Land-u. Forstwirtsch.* 18:-201-31.

PARATHION

(*Continued from Page 34*)

the parathion, a light layer of soil was sifted over the treated area and 3 gal. of water were applied evenly over each. Control plants also received 3 gal. of water.

Approximately 2 months after treatment, root samples were obtained from each plant and the meadow nematode populations within each determined. From the data on root nematode populations obtained before and after treatment, the percentage of increase or decrease for each treated plant was calculated. These percentages were analzed statistically and all treatments were found to be significant at odds of 99 to 1, with the 1 and 1½ lb. treatments appearing the most effective (Table 4).

Discussion

Of a group of organic and inorganic compounds investigated as possible therapeutics in the treatment of meadow nematode-infected boxwoods over the past 3 years, one compound, parathion, has appeared to be extremely effective.

Parathion does not seem to injure boxwood plants in the concentration used to control meadow nematodes effectively. A close observation was kept on the foliage of treated plants, but the characteristic leaf-cupping, which has appeared on certain other parathion treated plants, was not observed. These tests show that the chemical can effectively control the pathogen causing the disease, but its value in restoring normal healthy growth of nematized boxwoods has not yet been determined. It is thought that if the pathogenic nematodes are controlled the plants will resume normal growth, but it is also entirely possible that previously nematized boxwoods may continue to do poorly because of the damage incurred to the root systems. The growth of boxwood plants will necessitate a close observation of treated plants during the next few years.

Summary—In a series of greenhouse and field tests, 25 per cent wettable parathion was used as a treatment for meadow nematode- infected English boxwoods. Estimates of the effect of the chemical were based on a modified Baermann technique. Under both greenhouse and field conditions, nematode populations in the treated plants were reduced significantly without causing apparent plant injury. It was pointed out that although effective reduction of the root nematode populations was evidenced, it is yet too early to properly evaluate the effect of treatment on plant growth.

Literature

1. Dimock, A. W. and C. H. Ford. Control of foliar nematode disease of Chrysanthemums with parathion sprays. (Abstr.) *Phytopath.* 40: 7. 1950.

2. . Parathion controls leaf nematode disease of chrysanthemums.

N. Y. State Flower Growers Bul. 50:8. 1949.

3. Gleissner, B. D., F. Wilcoxon, and E. H. Glass. O,O-diethyl O-p-nitrophenyl thiophosphate . . . a promising new insecticide. *Agr. Chem.* 2: 61. 1947.

4. Granger, M. M. and R. W. Leiby. How plants absorb parathion. *Agr. Chem.* 4: 34, 35, 79-81, 83, 85. 1948.

5. Pritchard, A. E. and R. Beer. Parathion for control of pests of ornamental and flowering plants. *Jour. Econ. Ent.* 42 372-379. 1949.

6. Raski, D. J. and M. W. Allen. Spring Dwarf Nematode. *Calif. Agr.* 2: 23-24. 1948.

7. Schrader, G. The development of new insecticides. B.I.O.S. Final Report 714 *U. S. Dept Commerce, O.T.S.* PB-87923-R. 1945.

8. Tarjan, A. C. Parathion therapy of meadow nematode-infected boxwoods. (Abstr.) *Phytopath.* 40: 27. 1950.

9. . Utilization of the Baermann method as a means of assay of root infection by meadow nematodes, *Pratylenchus* spp. (Abstr.)

10. Thurston, J. T. Organic chemical intermediates for insecticides, fungicides, and rodenticides. F.I.A.T. Final Report 949, *U. S. Dept. Commerce, O.T.S.* PB-60890. 1946.

NFA MEETING

(Continued from Page 44)

content rather than the pounds of material in a bag. The sales force for such a manufacturer should act as a service crew for the best success, Mr. Dunton said. Mr. Miller added that the salesman must be trained to show dealers the saving involved in better grades of fertilizers.

The annual banquet was held Tuesday evening, with vice-chairman Louis Ware, president of International Minerals & Chemical Corp. presiding. In an informal program following the banquet, Ray King, Valdosta, Ga., immediate past-chairman of the board of directors was presented a handsome silver platter in recognition of his work for the Association. Mr. Ware then presented a travelog of his recent trip to Europe, emphasizing the contrast between the standards of living in the U. S. and those of other countries of the world. He was amazed to note how little most of the other nations have in the way of soils, minerals, chemicals, food production, etc., and reminded the banqueters that people in the U. S. are the world's best fed. He pointed out the significance of the fertilizer industry in bringing this about.

Mr. Ware declared that one has only to set foot on European soil to see how real is the threat against our way of life. He described the threat as very real, forceful and persistent, and declared that it may continue for many years. That the U. S. and other civilized nations have a world responsibility in checking this menace, was emphasized by the speaker.

A fine barbeque was given on Monday evening by the fertilizer manufactuturers of Mississippi. The gesture was greatly appreciated by the group.

The only disapointment in the program was the absence of Norris E. Dodd, director general of the Food and Agriculture Organization of the United Nations who was called away to a special emergency session of the U.N. and could not appear on the NFA program. He was to discuss the world food outlook.

Industry Patents

2,522,488. Water-soluble Salt of 2-4-D and Method of Producing Same Patent issued September 19 to Frederick C. Bersworth, Verona, N. J. The chemical compound consisting of a double alkali salt complex of 2-4 diclorophenoxy acetic acid and ethylene diamine tetraacetic acid, said salt complex having a pH in aqueous solution of about 7.

2,522,500. Production of phosphatic fertilizers. Patent issued September 19 to Grover L. Bridger, Ames, Iowa, assignor to Tennessee Valley Authority, a corporation of the United States. In a process for the manufacture of granular phosphatic fertilizer wherein an aqueous solution of phosphoric acid is mixed with phosphate rock, the resulting mixture is dispersed in droplets into an upper part of a vertical heated zone, the droplets are dropped downward through the heated zone in countercurrent to a stream of heated gas, and the resulting granular phosphatic fertilizer is withdrawn from a lower part of the heated zone, that improvement which comprises diluting superphosphoric acid containing from about 75% to about 87% P_2O_5 with water to a concentration of about 43% to about 57% P_2O_5; maintaining the resulting diluted acid in the temperature range from about 100° F. to about 140° F.; after not more 30 minutes from the time of such dilution intimately mixing the diluted acid with finely divided phosphate rock in such proportions that the mole ratio of CaO to P_2O_5 in the resulting mixture is approximately 1:1; maintaining the temperature of the mixture in the range from about 100° F.; within from about 1 to about 1½ minutes from the time of such mixing, pumping the acidrock mixture to said heated zone; spraying the mixture under pressure into an upper part of the heated zone; and passing a stream of gas at a temperature in the range from about 250° F. to about 1800° F. upward through the heated zone.

2,523,218. Insecticide composition comprising Hexaethyl tetraphosphate and di-(4-chlorophenoxy)-methane. Patent issued September 16 to Eugene E. Kenage, Midland, Mich., assignor to Dow Chemical Co., Midland, Mich. An insecticide composition comprising as active toxicants (1) hexaethyl tetraphosphate and (2) di-(4-chlorophenoxy)-methane, and wherein the mixture of toxicants exerts a synergistic effect as regards insecticidal toxicity.

2,523,227. Plant Growth Control Materials. Patent issued September 16, to Wendell R. Mullison, Midland, Mich, assignor to Dow Chemical Co., Midland, Mich. A compostion for controlling the growth of vegetation which comprises a carrier and dispersed therein as an active toxic ingredient the phenoxy-propoxy-propyl ester of 2,4-dichlorophenoxy-acetic acid.

2,523,228. Plant Growth Control Materials. Patent issued September 16, to Wendell R. Mullison, Midland, Mich., assignor to Dow Chemical Co., Midland, Mich. A composition for controlling the growth of vegetation which comprises a carrier and dispersed therein as an active toxic ingredient a member of the group consisting of the butoxy-propyl and butoxy-propoxy-propyl esters of 2,4-dichlorophenoxy-acetic acid.

2,523,252. Rodenticide Compositions Comprising Pentaesters of Tripolyphosphoric Acid. Patent issued September 19, to Franklin D. Smith, Webster Groves, and John S. Harris, Richmond Heights, Mo., assignors to Monsanto Chemical Co., St. Louis, Mo. A rodenticide and insectivoricide composition comprising a processed solid food product as an edible carrier and as a toxic ingredient, 0.5 to 20% of a pentaester of tripolyphosphoric acid, the said ester residue being a radical containing from 1 to 4 carbon atoms selected from the group consisting of alkyl, chloralkyl, alkenyl and cycloalkyl.

Trade Mark Applications

VALLEGREEN, in capital letters, for fertilizer. Filed Mar. 4, 1949 by Armour and Co., Chicago, Ill. Claims use since Feb. 3, 1949.

BOVETTE, "Gay nineties" capitals, for dehydrated cow manure, a biological, physical, and organic soil improver. Filed April 13, 1949 by Walker-Gordon Laboratory Co., Plainsboro, N. J. Claims use since October, 1948.

V-GREEN, capital "V" and small letters for the word green, for fertilizer. Filed April 19, 1949 by Armour and Company, Chicago, Ill. Claims use since Mar. 15, 1949.

NU-Z, in capital letters in circular arrangement enclosed in a circle with dots before and after the word. There is an an inner circle containing a map of Tennessee with the letters TC superimposed and the words Tennessee Corporation in capitals directly under the map. Filed April 23, 1949 by the Tennessee Corp., New York, N. Y. Claims use since Feb. 4, 1949.

ORANGE BELT, in capitals, for agricultural fertilizer. Filed Nov. 8, 1949 by Lyons Fertilizer Co., Tampa, Fla. Claims use since July 15, 1924.

GREEN HILL, in stencil letters with the last three letters of the word "hill" in plain capitals, for fertilizer. Filed Nov. 29, 1949 by Grocery Store Products Co., New York, N. Y. Claims use since June, 1949.

TENODIL, in capitals, for chemical toxicants for use in making or formulating herbicides, insecticides, fungicides and rodenticides. Filed Dec. 24, 1949 by Monsanto Chemical Co., St. Louis, Mo. Claims use since Dec. 8, 1940.

MELSAN, in outline capital letters, for fungicide and bactericide. Filed Jan. 6, 1950 by E. I. Du Pont de Nemours and Co., Wilmington, Delaware. Claims use since Feb. 8, 1949.

CO-OP, capital letters, for fertilizers. Filed Nov. 14, 1947 by National Cooperatives, Inc. Chicago, Ill., and Washington, D.C. Claims use since 1940.

EVERGREEN, in capitals, for fertilizer. Filed March 14, 1949 by Armour and Company, Chicago, Ill. Claims use since Feb. 9, 1949.

CHROMADEX, capitals arranged in a semi-circle, for plant food. Filed Feb. 14, 1950 by Rancho Del Descanso Plant Food Co. Inc., La Canada, Calif. Claims use since Jan. 13, 1950.

CAM-AZA, outline letters separated by hyphen between the "m" and "a," for camellia and azalea fertilizer. Filed Mar. 22, 1950 by Meridan Fertilizer Factory, Hattiesburg, Miss. Claims use since Dec. 20, 1949.

ICI, capital letters enclosed in the upper half of a circle, with two wavy black lines running beneath it, one almost through the center of the circle, for fertilizers. Filed Mar. 28, 1950 by Imperial Chemical Industries Limited, London and Millbank, London, England. Claims use since Nov. 12, 1929.

ORTHO LAWN GROOM, in capitals, enclosed in outline shield, under which is a sign which says: "Does 3 big jobs with one application"—on the left of the sign and enclosed in a bracket on the right hand side is the following: "Feeds your lawn, Kills weeds, Controls insects" with the first word of each in capital letters, for fertilizers. Filed March 27, 1950 by California Spray-Chemical Corp., Richmond, Calif. Claims use since Jan. 27, 1949.

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Chem. Engineer Clubs Unite

The Chemical Engineers Club of Washington has announced its recent affiliation with the American Institute of Chemical Engineers. The Club thus becomes the National Capital Section of the Institute.

Started several years ago, the Washington organization has attracted wide interest because of its annual public symposiums on scientific subjects. Last year Senator Clinton D. Anderson led a three man-panel on the subject of alleviating world-wide hunger. Man's battle against the insects and other pests was the topic for this year's meeting.

George Armistead, Jr., consulting engineer, is the president of the Club. Other officers are Randall D. Sheeline, U. S. Navy, William D. Kavanaugh, American Cyanamid Co., and Herbert W. Yeagley, Monsanto Chemical Co.

Classified Advertising

Rates for classified advertisements are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, $1.00 minimum. Address all replies to Classified Advertisements with Box Number, care of AGRICULTURAL CHEMICALS, 254 W. 31st St., New York 1. Closing date: 25th of preceding month.

Positions Wanted:

Sales Executive Available. 25 years experience with large firms as President, Executive Vice Pres. and General Manager, in foods, chemicals and metal specialties. Knows the national market and trade thoroughly. Has outstanding sales connections with mfgs. agents and brokers. Age 54 with success background for business. Minimum salary $20,000 plus bonus arrangement. Presently employed in St. Louis. Address Box No. 484, care of **Agricultural Chemicals.**

Research Consultant: 20 years experience management sales and research. Know midwest market and needs down to farmers level. Let me assist you in new product development and evaluation. Sales and market analyses on old products. Address Box No. 485, care of **Agricultural Chemicals.**

Research-Sales: Technical background, several years experience in research work—evaluating insecticides, fungicides and herbicides. Extension experience. Farm background. Desires employment in technical sales or research in East. Address Box No. 486, care of **Agricultural Chemicals.**

Research-Sales: Degree in Range and Forestry, Texas A&M College. Two years experience with state research group on chemical control of weeds and brush. Prefer research or combination research/sales position. For details address Box No. 487, care of Agricultural Chemicals.

Position Wanted: Agricultural College graduate, 21, majored soils phase of Agronomy. Desires employment in field. Gerald Elkan, 67-68 Groton, Forest Hills, New York.

Chemist: Ten years experience with degrees in biochemistry and bacteriology. Can handle plant, production, sales, insecticides, fungicides, germicides, and allied specialties. Excellent record. Best references. Desires new connection with manufacturer in any capacity where experience and training will count. For further information, address Box No. 488, care of Agricultural Chemicals.

Sales Representative—California— Currently employed chemical salesman with university degree desires change. Well acquainted with jobbers, dealers, compounders from bay area south. Open to offer with reliable, aggressive concern. Would consider handling several non-competing products on manufacturers representative basis. Address Box No. 489, care of Agricultural Chemicals.

Positions Open:

Agricultural Insecticide Salesmen: A client of ours has openings for three livewire salesmen of agricultural insecticides. To travel (1) the South, with headquarters in the South; (2) New England, with headquarters in New England; and (3) Midwest, with headquarters in Midwest. Selling is to dealers and distributors for reputable Eastern manufacturer. Method of compensation open. Reply, giving full details, The House of J. Hayden Twiss, Advertising, 225 Park Avenue, New York 17, N. Y.

Position Open: Pennsylvania agricultural chemicals jobber representing top-flight manufacturers seeks salesman to call on dealers. Offer good territory and possible share in company ownership to aggressive man who can produce results. Address Box No. 490, care of Agricultural Chemicals.

Wanted to Buy:

Plant Wanted: Wish to buy well established successful plant in Agricultural Chemical field. Medium size. Will buy capital stock or assets. Address Box No. 491, care of Agricultural Chemicals.

Miscellaneous:

If You Are Contemplating relocating, you should request a copy of "Business Opportunities in Watertown, South Dakota." Call or write Mayor Gilbert or the City Promotional Director, J. G. Ihnet.

Manufacturers Agent: A bulk item with little competition. Good sales volume and profits. Sell agricultural chemical jobbers and dealers. Exclusive for your state or area to right company or man. For details write Box No. 492, care of **Agricultural Chemicals.**

For Sale

For Sale: Are you missing any back copies of Agricultural Chemicals? If you wish to complete your files, communicate with M.F.A. Milling Company, Springfield, Missouri, Mr. S. B. Johnson.

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New Plant for Gamma

Gamma Chemical Corp. has announced the purchase of a new plant at Great Meadows, N. J., which covers 80 acres.

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New Chicago Sales Office

Pennsylvania Salt Manufacturing Co. has announced the removal of its district sales office to Suite 1216 Builders Building, 228 North LaSalle Street, Chicago. The new office will be under the direction of George D. Grogan, district sales manager for the company's Heavy Chemicals Department, and John C. Hampson, district sales manager for the Special Chemicals Department.

Form N. W. Plant Food Assn.

The Pacific Northwest Plant Food Association has been organized as successor to the Washington-Oregon Fertilizer Council. Meeting in Seattle, Wash., recently the group elected Al Fitzpatrick of the chemicals division, Pacific Supply Coperative, Portland, Ore., as president. Other officers are: Vice-president, Henning Waltersdorph, Magnolia Fertilizer Seattle, and treasurer, Alec Runciman, Webfoot Fertilizer Co., Portland. Along with the officers, Ted Shipley, of the plant food division, Swift & Co., Portland, and Mac C. Taylor, Oregon-Washington Fertilizer Co., Seattle, have been named to the board of directors.

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Offers New Clay

Monetta Clay Corp., Columbia, S. C., has introduced a new clay product, "Pest-X" for use as a primary extender for DDT, BHC, parathion chlordane and other insecticides. The product has been developed from free silica, the makers say. It has a small particle size, 15% being less than .5 microns and 70% less than 15 microns. It has pH value of 4.48 and produces a stable final product, the company states. Working samples are available from the company, 601 Carolina Life Bldg., Columbia 1, S. Carolina.

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Nitrogen Firm To Build

The Illinois Anhydrous Nitrogen Co., Centralia, Ill., has started construction of three bulk storage buildings for anhydrous nitrogen storage at Farmer City, Ill. The nitrogen will be shipped in tank cars from Texas. Plants are already operated by the firm at Holland, Mo., Blytheville, Ark.

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Frank Secord Dies

Frank G. Secord, manager of the plant food division of Swift & Co., Cleveland, Ohio, died November 7. He was sixty-two. Mr. Secord had been associated with Swift for forty-three years, including twenty-six as manager of the Cleveland division.

Advertisers' Index

DECEMBER, 1950

(The Advertisers' Index has been checked carefully but no responsibility can be assumed for any omission)

TALE ENDS

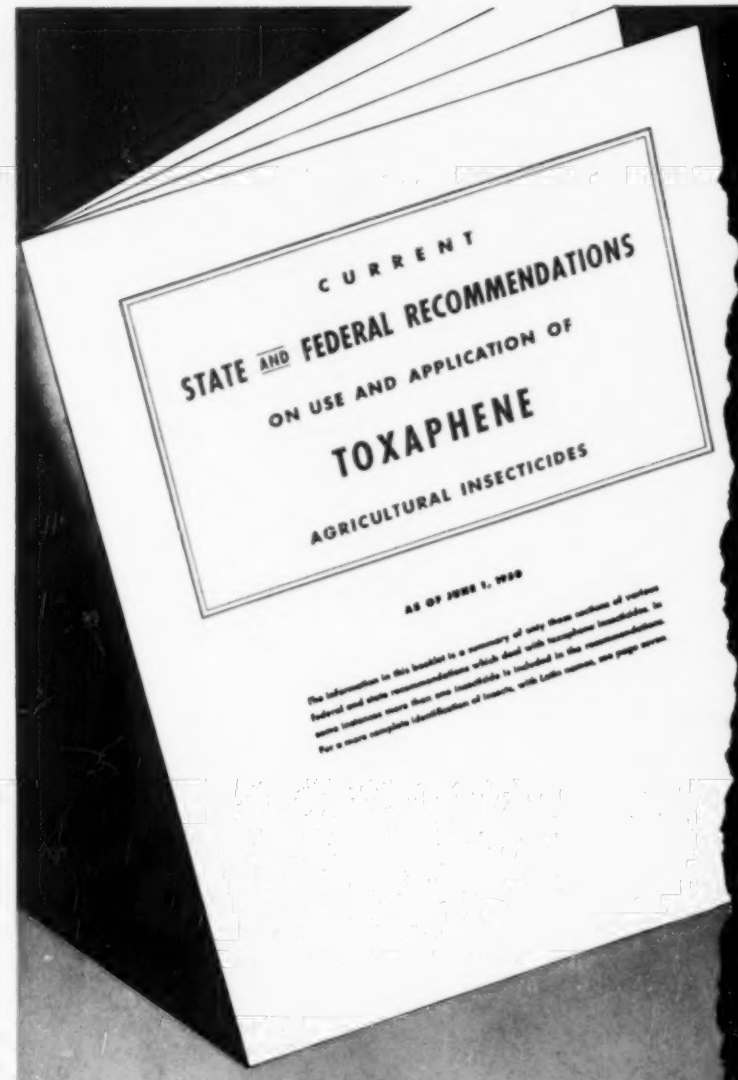
MANY favorable comments were heard regarding the locale of the recent fall meeting of the National Fertilizer Association on the Gulf of Mexico. The weather man smiled on the group during the entire period with balmy days and starlit nights . . .

One of the events of the meeting was entirely unscheduled; a minister was to give the invocation to start off the convention, but when called upon proved to be absent at the moment. Russell Coleman, NFA president, who had asked the crowd to stand for the prayer, broke the silence by offering as nice a prayer as anyone ever heard! His spontaneous act brought many remarks of both surprise and appreciation.

During the panel discussion of high and low analysis fertilizer mixtures, Dr. Ivan E. Miles was showing slides indicating various grades of fertilizer materials used in different sections of the country. Because of the nature of the subject, the slides were composed of graphs, charts, and tables all of serious nature, and the crowd was studying them intently while he described their significance. Suddenly there appeared on the screen the photo of a lovely bathing beauty, which brought an immediate response of laughter and whistles from the crowd, while Dr. Miles, with a straight face explained that this photo was just "ballast."

While scores of conventioneers breakfasted at the Edgewater Gulf, a bellboy went through the place paging in a loud voice, "Calling Mr. Rodale . . . Calling Mr. Rodale." Eyebrows were raised by the dozens and eating stopped momentarily while all eyes searched the room to see if there might be a response. There wasn't. Apparently someone with a sense of humor had put the boy up to it.

Following his address at the NFA meeting, J. E. Totman reported that "preliminary discussions with the purpose of exploring the possibility of consolidating NFA and APFC are under way. Our members will be kept informed of developments in these negotiations."



Toxaphene Will Kill These Pests

ALFALFA WEEVIL
ARMYWORM
ASH-GRAY BLISTER BEETLE
ASTER LEAF MINER
BLACK BLISTER BEETLE
BLACK CUTWORM
BOLL WEEVIL
BOLLWORM
CARAGANA BLISTER BEETLE
CAROLINA GRASSHOPPER
CATTLE-BITING LOUSE
CATTLE TICK
CHINCH BUG
CLEAR-WINGED GRASSHOPPER
CLOVER SEED CHALCID
COTTON APHID
COTTON FLEAHOPPER
COTTON LEAFWORM
DIFFERENTIAL GRASSHOPPER
EAR TICK
FALL ARMYWORM
GARDEN WEBWORM
GRANULATE CUTWORM
GRAY BLISTER BEETLE
GREEN CUTWORM
GULF COAST TICK
HAIRY CHINCH BUG
HOG LOUSE
HORN FLY
LESSER MIGRATORY GRASSHOPPER
LINED SPITTLEBUG
LITTLE FIRE ANT
LONE STAR TICK
LONG-NOSED CATTLE LOUSE
LYGUS
MEADOW SPITTLEBUG
MILLIPEDES
MORMON CRICKET
NUTTALL BLISTER BEETLE
PACKARD GRASSHOPPER
PEANUT (POTATO) LEAFHOPPER
PEAR PSYLLA
PEAR THRIPS
PINK BOLLWORM
RAPID PLANT BUG
RED GOAT LOUSE
RED-LEGGED GRASSHOPPER
SALT-MARSH CATERPILLAR
SERPENTINE LEAF MINER
SHEEP TICK
SHORT-NOSED CATTLE LOUSE
SOUTHERN ARMYWORM
SOUTHERN GREEN STINK BUG
SPITTLEBUG
STRAWBERRY CROWN BORER
STRAWBERRY LEAF ROLLER
STRAWBERRY WEEVIL
STRIPED BLISTER BEETLE
SUCKFLY
SUGAR BEET WEBWORM
SUPERB PLANT BUG
SWEET CLOVER WEEVIL
TARNISHED PLANT BUG
THRIPS
TOBACCO BUDWORM
TOBACCO HORNWORM
TOMATO HORNWORM
TOMATO PINWORM
TWO-STRIPED GRASSHOPPER
VARIEGATED CUTWORM
VELVETBEAN CATERPILLAR
WESTERN COTTON PLANT BUG
WHITE-LINED SPHINX
WINTER TICK
YELLOW GOAT LOUSE
YELLOW-STRIPED ARMYWORM

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